INSTALLATION RESTORATION PROGRAM

SITE INVESTIGATION PROJECT MANAGEMENT PLAN

SUFFOLK COUNTY AIR NATIONAL GUARD BASE SUFFOLK COUNTY AIRPORT WESTHAMPTON BEACH, NEW YORK

AUGUST 1991

HAZWRAP SUPPORT CONTRACTOR OFFICE
Oak Ridge, Tennessee 37831
Managed by MARTIN MARIETTA ENERGY SYSTEMS, INC.
For the U.S. DEPARTMENT OF ENERGY under contract DE-AC05-840R21400

INSTALLATION RESTORATION PROGRAM
PROJECT MANAGEMENT PLAN
FINAL DRAFT

SUFFOLK COUNTY AIR NATIONAL GUARD BASE
SUFFOLK COUNTY AIRPORT
WESTHAMPTON BEACH, NEW YORK

Prepared for:

NATIONAL GUARD BUREAU
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Submitted to:

HAZWRAP SUPPORT CONTRACTOR OFFICE
OAK RIDGE, TENNESSEE

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MARTIN MARIETTA ENERGY SYSTEMS, INC.
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AUGUST 1991

PROJECT MANAGEMENT PLAN
SUFFOLK COUNTY AIR NATIONAL GUARD BASE

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1.0 INTRODUCTION

This Project Management Plan (PMP) was developed for the Site Investigation (SI) phase of the Installation Restoration Program (IRP) being conducted at the Suffolk County Air National Guard Base (SCANGB) in Westhampton Beach, New York (Figure 1-1). The purpose of this PMP is to describe management approaches for completing the SI phase of the IRP at SCANGB.

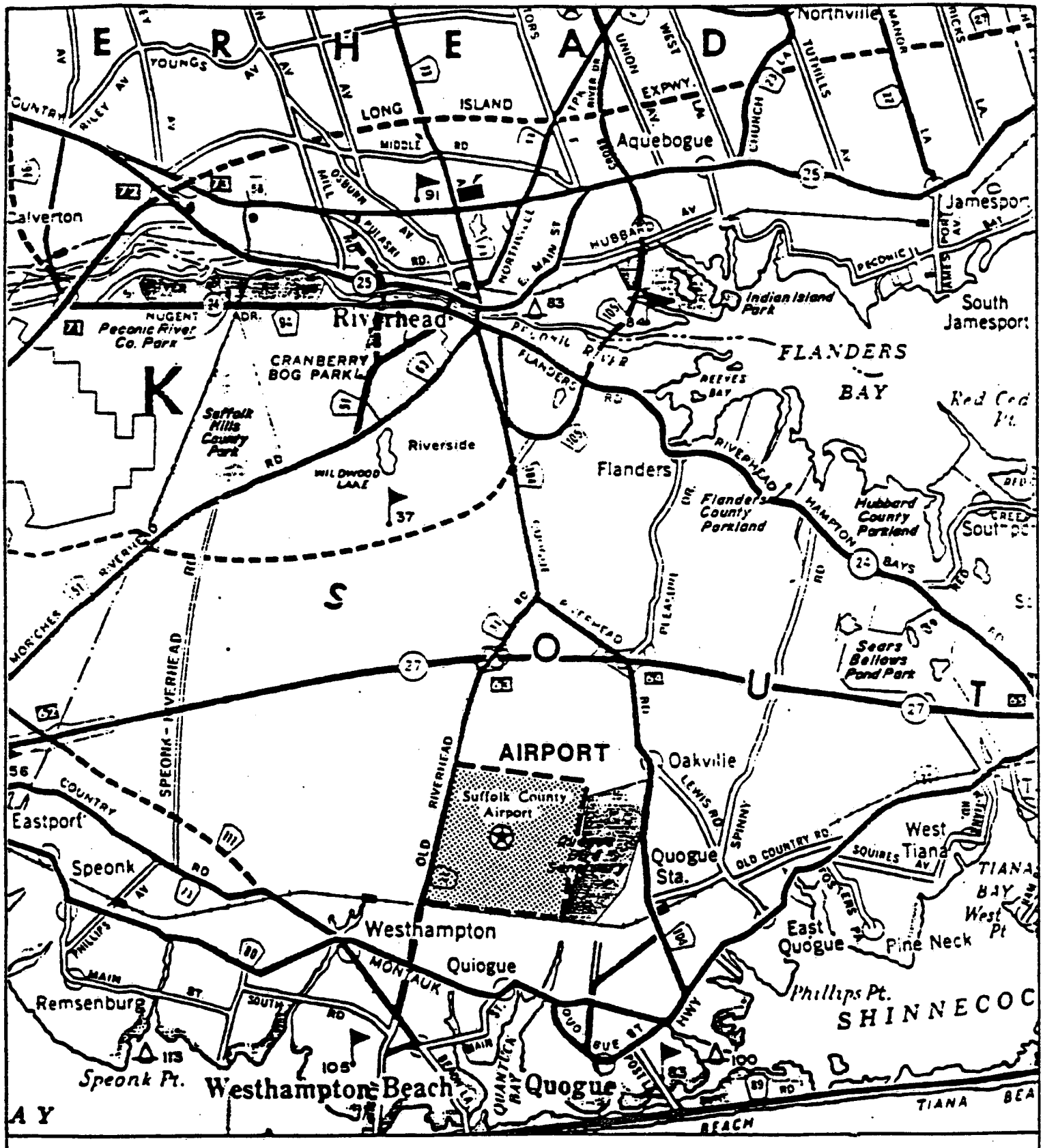
Section 1.0 of this PMP provides an overview of the IRP program, a history of the IRP at SCANGB, and guidelines and considerations used in developing this PMP. Sections 2.0 and 3.0 contain background information relating to SCANGB and information about specific sites being investigated. Section 4.0 presents an initial evaluation of the limited information available for the sites. Section 5.0 details the technical approaches (with rationale) to be used for the SI. Section 6.0 describes key components of IRP activities. Section 7.0 contains an overview of the project's task order organization, personnel, and support systems.

1.1 INSTALLATION RESTORATION PROGRAM

In 1980, Congress passed into law the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). CERCLA created a tax on chemical and petroleum industries to collect money for a trust fund, commonly referred to as Superfund, to clean up uncontrolled hazardous waste sites. The U.S. Environmental Protection Agency (USEPA) was granted the responsibility and authority to administer the Superfund program. Under Superfund, USEPA promulgated regulations and developed policies to identify, evaluate, and remediate sites from which hazardous substances were released to the environment. In 1986, the Superfund Amendments and Reauthorization Act (SARA) was passed in an effort to strengthen prior legislation, clean up federal facilities, and expand state involvement.

Prior to passage of CERCLA, the Department of Defense (DOD) initiated corrective action at its facilities by establishing the IRP with the objectives of identifying, investigating, and remediating contamination resulting from earlier waste disposal practices or spills. The IRP was defined in 1982 in the Defense Environmental Quality Program Policy Memorandum 81-5, which outlined a program structure consisting of the following four phases:

- Records Search - Phase I
- Site Characterization - Phase II



SOURCE: HAGSTROM ROAD MAP

SCALE IN MILES

0 1 2

FIGURE 1-1
SITE LOCATION MAP
PROJECT MANAGEMENT PLAN
SUFFOLK COUNTY ANGB

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- o Technology Development - Phase III
- o Planning and Implementation of Appropriate Control Measures - Phase IV

The goals of both the DOD (with the IRP) and USEPA (with Superfund) are congruent in intent. Initially, however, the procedures, terminology, and authorities of each program were different. The passage of SARA provided a catalyst to move the IRP into adoption of USEPA Superfund terminology. Therefore, the activities of the IRP, now compatible with USEPA, are described as follows:

Preliminary Assessment (PA). Identify and evaluate potentially hazardous waste disposal sites.

Site Investigation (SI). Confirm the presence or absence of contamination.

Remedial Investigation (RI). Quantify contamination and, if applicable, provide a public health evaluation.

Feasibility Study (FS). Develop and design a remedial action plan to solve the contamination problems.

Remedial Action (RA). Implement the selected remedial design.

Technology Development. Develop control technologies to resolve specific problems in situations where known remedial alternatives are inadequate or difficult to apply.

The steps leading to remediation have been supplemented with the concept of a Decision Document (DD) and Focused Feasibility Study/Remedial Measures (FFS/RM). This recent approach provides a mechanism to perform immediate actions during any stage of the IRP, or to address at any point the "no-action" alternative with a DD.

1.2 HISTORY OF THE INSTALLATION RESTORATION PROGRAM AT SCANGB

The National Guard Bureau (NGB) requested the support of the Department of Energy and Martin Marietta Energy Systems, Inc., Hazardous Waste Remedial Actions Program (HAZWRAP) in conducting the IRP for SCANGB in Westhampton Beach, New York. To date, two records searches have been conducted. The first records search was conducted for HAZWRAP by Dames and Moore, and a report was submitted in October 1986 (Dames

and Moore, 1986). The second records search was conducted by Dynamac Corporation through the Hazardous Materials Technical Center (HMTC) contract administered by the Defense Logistics Agency; the draft report was published in July 1987 (HMTC, 1987). These records searches are equivalent to the PA stage of the IRP activities, in that they identified known or potential hazardous substance release sites.

On July 7, 1989, HAZWRAP issued ABB Environmental Services, Inc. (ABB-ES), formerly E.C. Jordan Co., a request to propose on the SI portion of the program. The proposal was to be based on the Statement of Work (SOW) for SCANGB dated March 2, 1989. The response to this request was in two parts, a technical proposal and a business proposal, submitted September 5, 1989. The technical proposal presented guidelines for investigation of sites identified as having potential for contamination problems.

The SI was initiated with a kick-off meeting at SCANGB on July 24 and 25, 1989. The work plan was developed based on these discussions, a walkover of all sites, a briefing on current NGB SI philosophy, comments from a work plan review meeting, and information obtained from the 1987 HMTC records search. As a result of decisions made at the kick-off meeting, Site 6, identified by HMTC in the records search as the Petroleum, Oils, and Lubricants (POL) Tank Farm, was deleted from the SI program. A Cesspool/Septic Tank Survey (the new Site 8) was added by Amendment 1 to the SOW, dated July 27, 1989. Also, the area receiving surface runoff discharge from the refueling apron was identified as a site at that time. This site was designated Site 9, Ramp Drainage Outfall.

In addition to the sites identified by HMTC in the records search, ABB-ES has been investigating a separate site for SCANGB. On March 3, 1987, ABB-ES was asked to conduct an RI/FS at the Fire Training Area (FTA), which is located at Suffolk County Airport (SCA). This site is designated as Site 7. A records search, PA or SI, was not conducted at this site before ABB-ES's RI. Instead, ABB-ES conducted a limited records review prior to field activities and used applicable information from the Dames and Moore records search. ABB-ES installed two series of upgradient and downgradient wells at the FTA from March to April of 1987 and November 1989, and collected soil boring and groundwater samples for laboratory analyses. The RI/FS program at the FTA is still in progress.

2.0 SITE HISTORY AND PHYSICAL SETTING

2.1 DESCRIPTION OF SUFFOLK COUNTY AIR NATIONAL GUARD BASE

The same site designations presented in the 1987 records search report will be used in the SI for Sites 1 through 5 (Figure 2-1). The POL was assigned a site designation (i.e., Site 6) in the HMTC records search report and was listed in the original SOW for the RI/FS program (HMTC, 1987). However, HAZWRAP eliminated the POL site from the SI phase of the IRP; this was documented in Amendment 1 to the SOW. In addition to the sites identified in the records search, cesspools, septic tanks, and dry well associated with industrial and maintenance buildings will be investigated in the SI. This portion of the program is referred to herein as the Cesspool/Septic Tank Survey; the individual sites are identified as Sites 8A through 8L, Old Base Septic System. Also, Site 9, Ramp Drainage Outfall, was added to the SI. This site receives surface runoff from the refueling apron area.

Site designations, with site locations illustrated in Figure 2-1, are as follows:

Site 1: Aviation Gasoline (AVGAS) Spill Site. This site is located in the elevated parking lot north of the corner of Smith Avenue and Moen Street.

Site 2: Former Hazardous Waste Storage Area. This site is located in the northeastern portion of Building 358, adjacent to the current loading dock. Wastes were stored at this location prior to 1984.

Site 3: Current Hazardous Waste Storage Facility. This site was designated as the Current Hazardous Waste Storage Facility in the records search. It is located at the site of Building 282, south of the corner of Smith Avenue and Moen Street. Wastes were stored at this facility between 1984 and 1989.

Site 4: Aircraft Refueling Apron Spill Site. Site 4 is located northeast of the helicopter hangar (Building 395), in the grassy area adjacent to the northeast-southwest runway.

Site 5: Southwest Storm Drainage Ditch. This site is the drainage swale that lies north and west of Building 395. The ditch is located just off the paved areas surrounding the building.

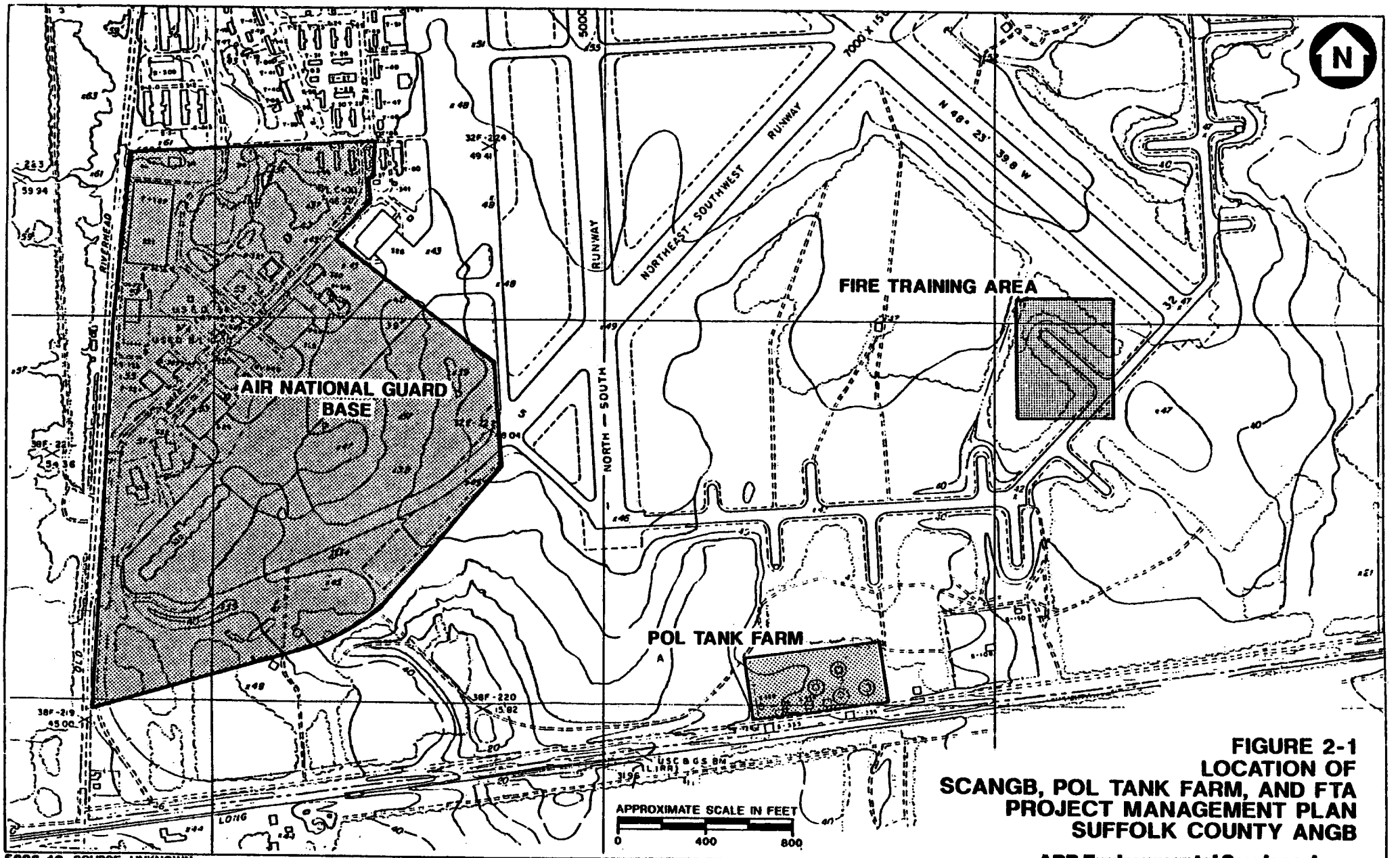

FIGURE 2-1
LOCATION OF SCANGB, POL TANK FARM, AND FTA
PROJECT MANAGEMENT PLAN
SUFFOLK COUNTY ANGB

5096-12 SOURCE: UNKNOWN

Sites 8A through 8L: Old Base Septic System. This site is actually a composite of cesspools, septic tanks, and two dry wells that receive discharges from several buildings or individual buildings where industrial and/or equipment maintenance activities occurred (Table 2-1).

Site 9: Ramp Drainage Outfall. Site 9 is located approximately 800 feet south of the refueling apron.

2.2 SITE DESIGNATIONS

The same site designations contained in the 1987 records search report will be used in the SI for Sites 1 through 5 (Figure 2-2). The POL Tank Farm was assigned a site designation (i.e., Site 6) in the HMTC records search report and was listed in the original SOW for the RI/FS program (HMTC, 1987). However, HAZWRAP eliminated the POL site from the SI phase of the IRP; this was documented in Amendment 1 to the SOW. In addition to sites identified in the records search, cesspools, septic tanks, and a dry well associated with industrial and maintenance buildings will be investigated in the SI. This portion of the program is referred to herein as the Cesspool/Septic Tank Survey; individual sites are identified as Sites 8A through 8L.

Site designations, with site locations illustrated in Figure 2-2, are as follows:

Site 1: Aviation Gasoline (AVGAS) Spill Site. This site is located in the elevated parking lot north of the corner of Smith Avenue and Moen Street.

Site 2: Former Hazardous Waste Storage Area. This site is located in the northeastern portion of Building 358, adjacent to the current loading dock. Wastes were stored at this site prior to 1984.

Site 3: Current Hazardous Waste Storage Facility. This site was designated as the Current Hazardous Waste Storage Facility in the records search. It is located at the site of Building 282, west of the corner of Smith Avenue and Moen Street. Wastes were stored at this facility between 1984 and 1989.

Site 4: Aircraft Refueling Apron. Site 4 is northeast of the helicopter hangar (Building 395), in the grassy area adjacent to the northeast-southwest runway.

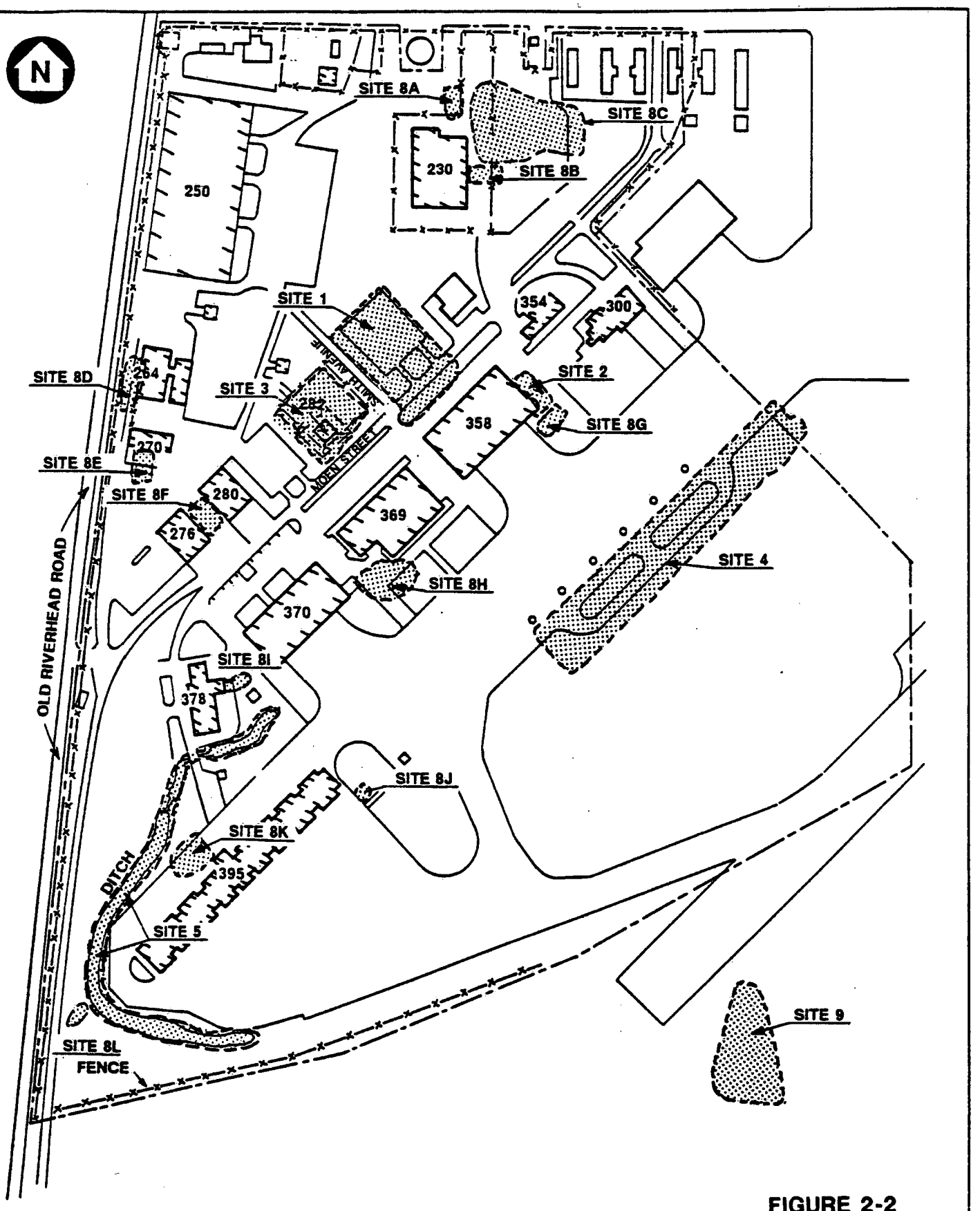

FIGURE 2-2
BOUNDARIES OF DISPOSAL/
SPILL INVESTIGATION SITES
PROJECT MANAGEMENT PLAN
SUFFOLK COUNTY ANGB

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Site 5: Southwest Storm Drainage Ditch. This site is the drainage swale that lies south and west of Building 395. The ditch is located just off the paved areas surrounding the building.

Sites 8A through 8L: Old Base Septic System. This site is actually a composite of cesspools, septic tanks, and two dry wells that receives discharges from several buildings or individual buildings where industrial and/or equipment maintenance activities occurred (Table 2-1).

Site 9: Ramp Drainage Outfall. Site 9 is located approximately 800 feet south of the refueling apron.

2.3 GEOLOGY AND HYDROGEOLOGIC SETTING

SCA topography is generally flat with subtle rolling terrain and steeper stream channels primarily flowing due south (U.S. Geological Survey, 1956). Topography is primarily a function of regional geology. The airport is located on a glacial outwash plain south of the Ronkonkoma Moraine, which forms the long east-to-west trending ridge visible from SCA. Glacial outwash materials form the surface geology and surface features at the airport. Based on data from explorations at Site 7 (see Figure 2-1) and from published reports, these sand and gravel deposits are approximately 100 to 200 feet thick at the site, increasing in thickness to the south (Figure 2-3).

Site surface soils belong to either the Riverhead-Plymouth-Carver Association or the Plymouth-Carver Association, the latter comprising approximately 95 percent of soils at SCANGB (Warner et al., 1975). As the names suggest, these soil associations are similar, with only subtle variations between the separate units. The soils can be characterized as deep, excessively well drained, fine- to coarse-textured loamy sands over thick layers of stratified coarse sand and gravel. These glacially generated soils have very low moisture capacity and generally are not suitable for agricultural purposes, supporting only selected natural vegetation.

Published data indicate that a clay unit termed Gardiners Clay lies beneath the glacial deposit and pinches out north of SCA. However, this unit was not encountered in any borings completed during previous investigations at the site (one boring was advanced to a 155-foot depth). This clay unit reportedly consists of a 40-foot-thick layer of green and gray clay, silt, and clayey or silty sand with some clayey gravel. The unit has a low bulk hydraulic conductivity and tends to confine water in the underlying aquifer. Underlying these deposits are the Magothy Formation, which consists of a deposit of marine sand and silt, and the Raritan

TABLE 2-1
LIST OF CESSPOOLS AND SEPTIC TANKS TO BE SURVEYED

PROJECT MANAGEMENT PLAN
SUFFOLK COUNTY AIR NATIONAL GUARD BASE

SITE DESCRIPTION	BUILDING	CESSPOOLS/SEPTIC TANKS/DRY WELLS
8A	230	Oil and Mud Trap and 2 attached cesspools, 11,500 gallons each
8B	230	1 septic tank (3,000 gallons) and attached cesspool (11,500 gallons)
8C	218, 220, 222, 329	1 septic tank (unknown capacity), 1 abandoned septic tank, 8 cesspools, 7 abandoned cesspools
8D	264	2 cesspools (unknown capacity)
8E	270	1 cesspool (2,310 gallons)
8F	276	1 septic tank (897 gallons) and attached cesspool (3,384 gallons)
8G	358	1 septic tank (3,840 gallons) and 2 attached cesspools (13,356 gallons each)
8H	370	5 cesspools (12,690 gallons) shared with Building 369
8I	378	1 septic tank (2,229 gallons), 1 cesspool (5,875 gallons), and 1 dry well
8J	395	1 dry well
8K	395	1 septic tank (1,000 gallons) and 3 attached cesspools (3,000 gallons each)
8L	395	1 abandoned septic tank (unknown capacity) and 1 abandoned cesspool (unknown capacity)

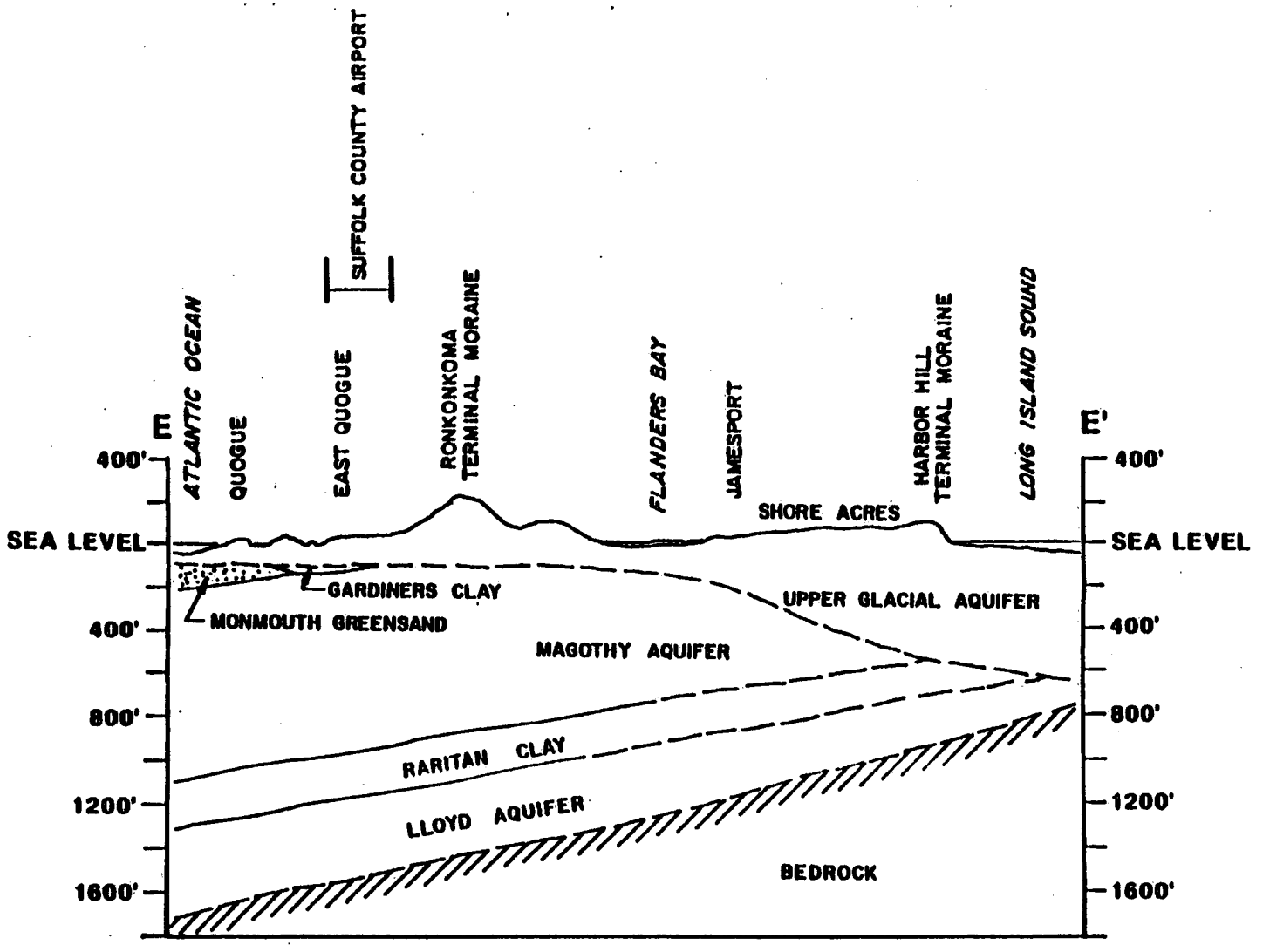


FIGURE 2-3
REGIONAL STRATIGRAPHY BENEATH SUFFOLK COUNTY AIRPORT
PROJECT MANAGEMENT PLAN
SUFFOLK COUNTY ANGB

SOURCE: HYDROGEOLOGY OF SUFFOLK COUNTY, LONG ISLAND, NEW YORK, U.S.G.S. PUBLICATION.

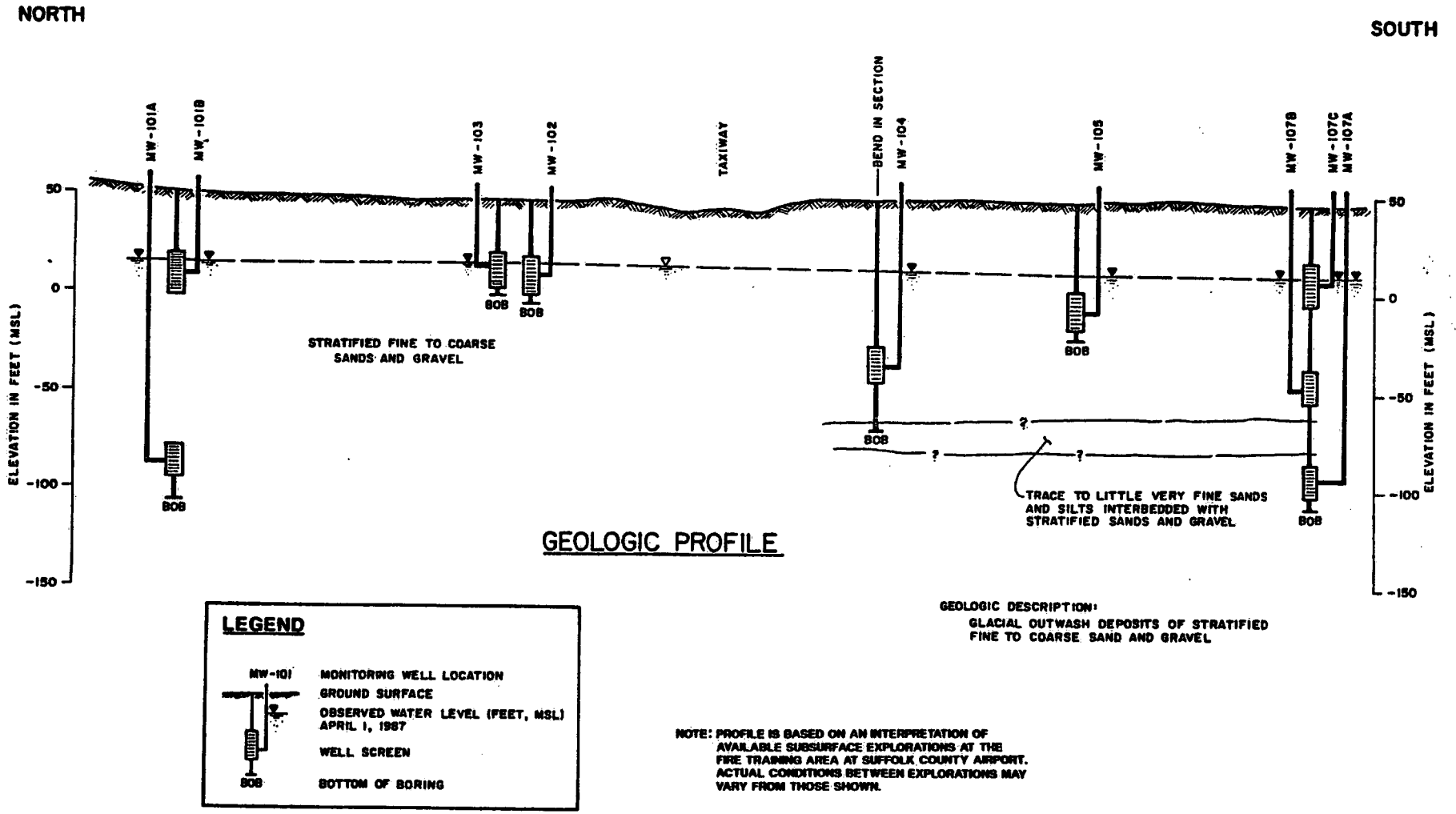
Formation, which consists of a clay layer of marine origin. Underlying the Raritan Clay is the Lloyd Sand member. Bedrock encountered in two borings 18 miles west of the airport indicates that bedrock depth is about 1,600 feet below ground surface (bgs). The bedrock consists of Precambrian or Cambro-Ordivician age, dense schists, gneiss, or granites.

The geohydrology or groundwater hydrology beneath SCA can be summarized as consisting of five units acting as alternating aquifers and aquitards (Jensen and Soren, 1974). The Upper Glacial aquifer is the highest yielding and most accessible aquifer. This highly permeable unit is widely used for drinking water supplies in the area, and is also the most susceptible to contamination from surface sources. The risk assessment conducted at the FTA (Site 6) indicates that no known drinking water wells are located within one-half mile of SCANGB. The underlying Gardiners Clay is considered an aquitard; it separates the surficial glacial outwash materials from the underlying Magothy Formation aquifer. The Magothy Formation is considered an important alternate aquifer to the outwash aquifer. The Raritan Clay at the base of the Magothy Formation is an aquitard that hydraulically confines the underlying Lloyd Sand aquifer.

Depth to groundwater at the site varies from approximately 5 feet at the southern end of the base, to 35 to 40 feet at the highest ground surface elevations. The groundwater elevations equate to a range of elevations from 15 to 20 feet above Mean Sea Level (Suffolk County Department of Health Services, 1985). Upper glacial soils are highly permeable; however, flow rates are primarily controlled by the generally low horizontal groundwater gradients.

The aquifer of primary concern in the SI is the glacial outwash aquifer, which directly receives leachate from any ground surface contamination and surface water bodies in the area. The two major surface water drainages are Aspatuck Creek (south of SCA) and Quantuck Creek (southeast of SCA). Located just southeast of SCA is the Old Ice Pond, which is connected to the Quantuck Creek system. Surface water drainage from the 70 acres comprising SCANGB primarily flows to Aspatuck Creek.

ABB-ES completed soils borings for monitoring well installations in 1986 and 1989 at ~~the~~ Site 6. Several borings were completed to more than 150 feet deep. Soil boring logs contained in the appendices of the final site characterization report indicate that soils encountered at the site consist of stratified, current-bedded, fine-to-coarse sands and gravels (E.C. Jordan Co., 1989a). The glacial outwash unit was the only soil unit encountered in all borings at the FTA. An interpretive cross section is shown in Figure 2-4. Results of hydrologic studies at this site indicate that groundwater is flowing at a rate of approximately 300 feet per year. This velocity should be used only as an approximate value for the base, because flow velocity is highly dependent on groundwater gradients, which may vary.



SOURCE: FINAL SITE CHARACTERIZATION REPORT, SUFFOLK COUNTY AIRPORT FIRE TRAINING AREA; E.C. JORDAN CO., JUNE 1989.

FIGURE 2-4
INTERPRETIVE GEOLOGIC PROFILE
SITE INVESTIGATION SAMPLING AND ANALYSIS PLAN
SUFFOLK COUNTY ANGB

3.0 BACKGROUND INFORMATION

3.1 PREVIOUS STUDIES

Several investigations were conducted at SCANGB, including the records searches by HMTC from January 27 to 29, 1986, and by Dames and Moore from August 4 to 6, 1986. The records searches involved the following activities:

- an on-site visit, including interviews with nine base employees
- acquisition and analysis of information and records on hazardous materials used or potentially generated, and the disposal of those wastes
- review of available chemical and physical data regarding the site
- identification of sites at SCANGB that have the potential to be contaminated with hazardous materials

The records searches indicated certain areas and facilities that had potential for hazardous material releases. These sites, highlighted in the HMTC records search report as needing further investigation, are summarized in Subsection 2.2.

3.2 SITE-SPECIFIC INFORMATION

The following subsections contain brief historical summaries of sites to be investigated as part of the SI. The information has been summarized from the HMTC records search report. Site locations are illustrated in Figure 2-2. More detailed site illustrations are in the Sampling and Analysis Plan (SAP).

3.2.1 Site 1: AVGAS Spill Site

Site 1 is north of the corner of Moen Street and Smith Avenue in the center of the SCANGB complex. The site consists of an elevated parking lot, two entrance driveways, and a small drainage swale on the southern side of Moen Street. The entire site is approximately 1 acre in size.

Site 1 Background. In 1965, a tanker truck parked in the elevated parking lot released a maximum of 5,000 gallons of AVGAS. Little is known about the actual details of the spill except that the fuel may have accumulated in the drainage swale southeast of the parking lot, on the southern side of Moen Street. AVGAS reportedly ponded in the swale and the street. No recovery of the AVGAS was attempted, and the fuel dissipated through evaporation and infiltration in the soil.

3.2.2 Site 2: Former Hazardous Waste Storage Area

Site 2 is located adjacent to the northeastern corner of Building 358 between a loading ramp and parking lot. This area is mostly grassed; however, some areas are covered with asphalt and concrete. The area is less than 1,000 square feet in size.

Site 2 Background. This site was used until 1984 for storage of shop wastes and recovered fuels and oils from various areas of SCANGB. The storage area does not have a containment structure. It was reported that drums of wastes were stored next to the building and adjacent to the loading dock. The HMTC records search report states that surface soil contamination was evident during the site visit (HMTC, 1987). Spills have not been reported at this site.

The various compounds stored at the site originated from various sources. Shop wastes included waste PD-680 and recovered fuels and oils. There was no reported bulk storage of wastes at the site. Use of the storage area was discontinued in 1984; wastes were subsequently stored at Site 3.

3.2.3 Site 3: Current Hazardous Waste Storage Facility

(NOTE: This site was identified in the records search as the Current Hazardous Waste Storage Area.) Site 3 is located in a paved parking lot in a gravel area that used to be the floor of Building 282. The building was used as the Hazardous Waste Storage Area until it was removed in 1989. Wastes are no longer stored at this site.

Site 3 Background. During the mid-1980s, this area became the location for storage of shop wastes, recovered oils, and waste fuels at SCANGB. In the HMTC records search report, the site was described as consisting of a small building in a state of disrepair, with numerous holes in the steel roof, no doors or windows, and an open gravel floor (HMTC, 1987). The building reportedly contained drums stored both on their sides and upright; precipitation accumulated on the upright drums. Discolored gravel and soil were observed throughout

the facility. No spills have been recorded at this site. The types of wastes reportedly stored in Building 282 were solvents, POL products, and strippers.

3.2.4 Site 4: Aircraft Refueling Apron

Site 4 is southeast of the refueling apron, which is east of Building 395. The site consists mostly of the grassy area just south of the refueling apron. The actual size of the site is unknown; it probably is less than 2 acres.

Site 4 Background. In the records search report, HMTC identified the Aircraft Refueling Apron site (Site 4) as a potential source of contamination because of its prolonged use as the probable site of routine fuel dripping, hydraulic fluid leaks, and solvent use. This area has been used for years as an aircraft refueling apron for various types of aircraft. The site consists of a concrete pad with flush fuel outlets located near the edge of the apron. The fuel outlets are located within a depression in the refueling area. Consequently, spills and runoff would not flow from the refueling area onto the adjacent grassy area. HMTC did not observe any visible signs of contamination in the grassy area adjacent to the refueling apron.

Fuel from the POL Tank Farm located south of SCANGB is pumped to the refueling apron (see Figure 2-1). The fuel is pumped directly to fuel outlets through an underground pipe that lies parallel to the taxiway and apron. Unused fuel is then pumped back to the POL in another underground pipe via a jet fuel sump tank located northeast of the refueling apron. A recent leak detection study conducted by Tracer Research Corporation (Tracer) indicated potential leaks in the fuel lines at locations parallel to the refueling apron (Tracer, 1989). These locations corresponded to areas of fuel outlets and the sump tank, possibly where pipe joints would be located. SI activities at Site 4 will focus on potential subsurface releases from these areas of the fuel line.

3.2.5 Site 5: Southwest Storm Drainage Ditch

This site, located west and south of Building 395 (i.e., the aircraft hangar), consists of the large surface drainage ditch surrounding the building. The ditch starts as an outfall for Building 370, runs through a culvert underneath an access road to Building 395, and is exposed the entire distance around Building 395. The ditch ranges from 5 to 15 feet in depth.

Site 5 Background. The storm drainage ditch receives runoff from roof drains and several large paved areas in the southwestern portion of the base. HMTC reported that during its interviews with past and current base personnel, it was disclosed that an oily sheen had been

observed in the ditch during occasional episodes of heavy precipitation. HMTC also reported vegetative stress during the site walkovers (HMTC, 1987).

3.2.6 Sites 8A through 8L: Old Base Septic System

All wastewaters at SCANGB are discharged to septic tanks and associated cesspools. In addition, some waste and stormwater runoff streams are collected in dry wells and surface drainage ditches. At the SI kickoff meeting and the work plan review meeting, it was decided this SI also would evaluate the potential for contamination relative to septic tanks, cesspools, and dry wells that received wastestreams from industrial and/or equipment maintenance activities. The buildings and associated structures to be investigated are identified in Subsection 2.2 and in Table 2-1. There is no specific information available on the types of wastes discharged through these waste systems.

3.2.7 Site 9: Ramp Drainage Outfall

Site 9, the Ramp Drainage Outfall, is located approximately 800 feet south of the refueling apron. The outfall discharges to a willow depression, which broadens rapidly within 100 feet of the outfall.

Site 9 Background. The surface drainage for the refueling apron is collected in five catch basins located along the alignment of the fuel outlets in the refueling aprons. The catch basins are located on 200-foot centers that straddle the fuel outlets, and receive runoff from the fueling apron area. The surface drainage flows through underground pipes to a location just north of the jet fuel sump tank and then runs over 1,000 feet to where it discharges approximately 800 feet south of the refueling apron. This discharge was identified in the SI work plan review meetings as the Ramp Drainage Outfall site; hereinafter, it is designated as Site 9.

4.0 INITIAL EVALUATION

4.1 TYPES AND VOLUMES OF HAZARDOUS MATERIALS

The records search report issued by HMTC identified the types of hazardous materials used at SCANGB, and the operations that used these materials. These operations include aircraft maintenance; Aerospace Ground Equipment (AGE) maintenance; ground vehicle maintenance; and POL management and distribution. Hazardous substances generated by these operations include waste oils, recovered fuels, spent cleaners, paint removers, thinners, strippers, and cleaning solvents.

The PA process and ensuing report identified six disposal or spill sites at SCANGB with the potential for contaminant problems that are to be addressed by the SI. Site 6 identified in the PA (i.e., POL site) is the subject of a separate, ongoing investigation and was not tasked as part of this investigation. All the other sites are discussed in Subsections 3.2.1 through 3.2.6 of this PMP. Wherever possible, HMTC estimated the quantities of hazardous materials that may have been released. However, because records do not exist describing such releases, exact quantification is not possible and some estimates are based on personal recollections of past practices.

4.2 POTENTIAL CONTAMINANT MIGRATION PATHWAYS

Data to fully characterize contaminant pathways are not yet available because a field exploration program to define groundwater flow directions and aquifer characteristics has not been conducted at SCANGB. However, a preliminary identification of potential pathways can be accomplished by a review of available information such as site topography, the location of regional drainage features including rivers and manmade influences, and the types of compounds released and their expected behavior in soil and groundwater media.

Suspected contaminant releases at the sites apparently occurred at or just below ground surface (bgs). Contaminants would be expected to percolate downward through the pore spaces of soils to the water table. At the groundwater surface, several factors will influence the continued direction and rate of contaminant migration. The most important include compound density relative to water, compound solubility in water, and local groundwater flow direction.

The bottom of the water table aquifer may represent a potential pathway for migration of contaminants denser than water. If released in significant concentrations, compounds with a density greater than 1.0, including chlorinated solvents, will tend to sink through the aquifer from gravitational influences rather than moving with groundwater flow. When these compounds reach an impermeable geologic unit, they will tend to follow any downward slope of such a unit. Based on its solubility, a portion of the heavy compound will dissolve into the groundwater and migrate in the direction of groundwater flow. Currently, the bottom of the water table aquifer at the base is not defined, but is expected to be approximately 1,600 feet bgs (see Subsection 2.3).

Compounds lighter than water will tend to solubilize in the upper portions of the water table aquifer. Floating product will exist at the water table surface if contamination levels exceed that which can be dissolved in groundwater. These lighter compounds will flow in the general direction of groundwater movement.

4.3 PRELIMINARY PUBLIC HEALTH AND ENVIRONMENTAL IMPACTS

Potential public health impacts associated with contaminant exposure at SCANGB are qualitatively assessed based on information contained in the HMTC records search report. The types of hazardous materials used and locations of spills and/or disposal areas at this facility suggest that contaminant exposure could potentially occur through direct contact and/or ingestion of contaminated soils and groundwater. Because of the different considerations given to evaluating soil and groundwater exposure, these two media are discussed separately. Exposure potentials discussed in this subsection are based on the Public Health Exposure Assessment described in the Site Classification Report for Site 7 (FTA) at the Suffolk County Airport (E.C. Jordan Co., 1989a).

Soils. Exposure by on-base personnel to potentially contaminated soils may occur during normal operational or maintenance activities at the sites described in Section 3.0. Contaminants that are lipophilic and/or adsorb to soil or organic particle surfaces still may be present in surface soils at these sites. Contaminants could include those associated with oil and lubricant products and waste oils. Other more mobile (i.e., water soluble) contaminants disposed of or spilled at these sites may not be present on surface soils, but may have percolated downward through the soil resulting in subsurface soil contamination. These contaminants could include compounds associated with JP-4 fuel (i.e., benzene, toluene, and xylene), paint removers, and cleaning solvents (i.e., chlorinated hydrocarbons).

The major routes of exposure to soil contamination are direct contact and incidental ingestion. The occurrence of incidental ingestion of soil (e.g., adsorbed onto hands) is considered minimal and would not be expected to contribute significantly to exposure at this facility. Direct contact exposure is considered the most significant route of soil contaminant exposure for on-base personnel. The frequency of direct contact exposure to soil contaminants is related to particular activities required at each site. Other factors contributing to potential exposure include exposed surface area and contaminant concentration. Because chemical-specific data are not available, potential exposure doses from this route of exposure cannot be estimated at this time.

Of all potential off-site populations, adults are most likely to access the facility and potentially contact contaminated soil. Because most of the sites are located in a fenced area surrounded by an airport facility, repetitive exposure is considered unlikely. Off-site populations are expected to have intermittent or once-in-a-lifetime exposure, and, therefore, a lower exposure risk than on-base personnel.

Groundwater. Exposure by on- and off-base receptors to potentially contaminated groundwater may occur through domestic use of groundwater beneath SCANGB. Municipal water is supplied to surrounding residences. A municipal wellfield exists approximately 1 mile south of SCANGB; however, there is insufficient information to speculate whether groundwater from the area of the base would impact this wellfield. Area geology suggests that contaminants disposed of or spilled on surface soils rapidly percolate through the soil to groundwater. Depending on the volume of waste disposed of or spilled, and the chemical and physical properties of specific contaminants, past disposal practices may have resulted in contaminated groundwater.

Environmental Impacts. Potential environmental impacts associated with contaminants at the base are difficult to evaluate at this time. The undeveloped pine barrens surrounding the site provide a habitat for various animal species. Many birds, rodents, and deer are known to nest, reside, and feed in the grassy and wooded areas between and surrounding the airport runways. It is probable that most of these species remain in the undeveloped areas most of the time.

Terrestrial organisms could be at risk from contaminant exposure, if suitable habitats exist on base. Organisms such as earthworms and small rodents could be at risk of direct contact with soil from burrowing through contaminated areas. Depending on the bioaccumulation of contaminants, higher trophic organisms could also be at risk. Due to lack of vegetation, it is unlikely that animal species reside on the base. However, certain animals may pass through while moving from one wooded area to another. There are no permanent surface

water bodies or streams flowing through this facility. Most surface water runoff ultimately drains to Aspatuck Creek through various drains, ditches, and tributaries.

4.4 PRELIMINARY IDENTIFICATION OF RESPONSE OBJECTIVES

Remedial response objectives specify the goals of a remedial action and identify the proposed level of cleanup associated with the specific chemical contamination problems in various media at a site. Response objectives based on the contaminant(s) of concern, exposure route(s), and receptor(s) are designed to protect public health and the environment. They represent acceptable contaminant levels or ranges of levels for each exposure route. Applicable or Relevant and Appropriate Requirements (ARARs) of environmental regulations that establish clean-up standards (e.g., Maximum Contaminant Levels [MCLs] for drinking water) are also used to determine remedial response objectives.

As previously discussed, limited information is currently available concerning the types and volumes of hazardous substances present in environmental media at SCANGB or the potential exposure routes or receptors to potential contamination. Exposure pathways presenting a possible threat to public health are the domestic use of potentially contaminated groundwater (e.g., drinking, showering, bathing, and cooking) and dermal contact with potentially contaminated soils. The degree of potential risk depends on the amount, concentration, hazardous properties, environmental fate, migration path, and form of the substances present.

Based on site information gathered to date, the following preliminary response objectives for site remediation are proposed:

- reduce potential public health risks posed by use of potentially contaminated groundwater as a domestic water supply
- remediate or limit migration of groundwater, if contaminated, so that applicable federal and state drinking water standards are met
- reduce potential public health risks posed by dermal contact with potentially contaminated soils
- prevent or eliminate leaching of any existing contaminants in the soils and cesspools to a potential domestic water supply

As information is developed during the SI and any subsequent investigation, these response objectives will be further refined, and RA alternatives may be developed to meet response objectives. SARA requires that the remedy be protective of human health and the environment, attain ARARs, be cost-effective, and use permanent solutions or resource recovery technologies to the maximum extent practicable. The guidelines require consideration of alternatives within a broad range of performance, as well as no-action and on-site containment options. In an effort to be consistent with the requirements of SARA and the National Contingency Plan (NCP), remedial action alternatives will be organized according to the following preliminary alternative categories:

- no-action alternative
- alternatives that permanently reduce mobility, toxicity, or volume
- alternatives representing off-site storage, destruction, treatment, or disposal at a Resource Conservation and Recovery Act (RCRA) facility
- alternatives requiring no long-term management at the site
- on-site containment alternatives
- alternatives that attain federal and state (when more stringent) chemical-specific ARARs

5.0 WORK PLAN RATIONALE

5.1 WORK PLAN APPROACH

The SAP accompanying this PMP was developed based on the HMTC records search. Section 3.0 of this PMP contains historical summaries of five potentially contaminated sites identified in the HMTC records search that have been recommended for SI exploration activities. The SI kickoff meeting and site visit by ABB-ES personnel in August 1989 provided additional information with which to develop the SI Work Plan. A Cesspool/Septic Tank Survey and Site 9 were also added to the SI program based on discussions during the SI kickoff meeting. Specific site exploration details are included in the SAP.

5.1.1 Baseline Technical Methodology

The initial investigation of SCANGB will be an SI, which will assess the presence or absence of contamination at identified sites and provide a general understanding of basewide geologic and hydrogeologic conditions. The SAP describes specific methods of exploration, the number and locations of borings and monitoring wells, and the sampling and analytical program for each site. The SAP also describes the purposes of each exploration technique to be employed and the data to be obtained by each.

The approach to the SI is to gather sufficient data on the sites to be investigated to enable one of the following determinations to be made for each site:

- no further action is required; prepare DD
- an imminent threat to public health and the environment exists requiring an FFS/RM
- a potential risk exists, but more data are required to define remedial measures; proceed to RI/FS phase of IRP

Data quality objectives (DQOs) should correspond with these goals. The approach to be taken at SCANGB is to perform initial exploration activities using field analytical screening techniques, including soil gas surveys and field gas chromatography (GC) screening of soil and water samples, to better define potential contamination areas. These activities will be followed by additional explorations to collect samples for laboratory analyses to yield data for contamination assessments and characterization of risks.

5.1.2 Health and Safety Plan

A Health and Safety Plan (HASP) was prepared as part of the SAP for use during the SI. Site-specific health and safety (H&S) procedures to protect field personnel and others in the investigation area are included in the SAP. The HASP will be updated and revised appropriately for each major program activity.

5.1.3 Quality Assurance Project Plan

A program Quality Assurance Project Plan (QAPP) was prepared for use in HAZWRAP studies (C-E Environmental, 1989). A site-specific QAPP is appended to the accompanying SAP for each major program activity. This QAPP includes site-specific procedures and methodologies to ensure quality assurance/quality control (QA/QC) for all phases of field operations. These site-specific procedures supplement the QAPP prepared for use in HAZWRAP studies submitted previously to HAZWRAP.

5.1.4 Project Community Relations

ABB-ES will provide SCANGB with a site-specific Community Relations Plan (CRP) for the combined RI/FS process, according to guidance provided by USEPA (USEPA, 1988d). The CRP will outline both required and suggested supplemental community relations (CR) activities to be implemented by SCANGB. A schedule for CR task implementation, matched to the appropriate technical phase of the RI/FS process, will be developed. The objectives of the CRP for SCANGB are to (1) help achieve community understanding of the studies to be undertaken, and (2) obtain community input to the decision-making process involving selection of remedial alternatives.

5.1.4.1 Community Relations Plan Development. Interviews will be conducted with selected local residents, government officials, community groups, news media representatives, and other individuals interested in or concerned by site activities.

The interviews will elicit firsthand information about the local community to better understand future community involvement with the facility and the political climate in the area. The interview process will also identify credible sources and disseminators of information, and provide insight about how and when the community would like to be involved in the remediation process. A facility-specific CRP will be developed using insights gained during the interview process. The CRP will contain five sections and two appendices, as follows:

- Section I - Overview of the CRP
- Section II - Capsule Site Description
- Section III - Community Background
- Section IV - Highlights of the CRP
- Section V - CR Activities and Timing (Schedule)
- Appendix A - Mailing List of Key Contacts and Interested Parties
- Appendix B - Recommended Locations for Meetings and Information Repositories

The CRP will be submitted as a first draft, draft final, and final approved version. The final approved CRP will be a flexible document that can be revised (as necessary) to reflect project revisions and changing community attitudes and requirements. A schedule for completion of the CRP within the scope of the SI program is provided in Section 5.0 of the SAP accompanying this PMP.

5.1.4.2 Community Relations Support. SCANGB will be responsible for implementing all CR activities and the CRP. Upon direction from HAZWRAP, ABB-ES will support SCANGB CR efforts by providing, as required, the following personnel, services, material, and equipment:

- advising ANG personnel on CR matters
- preparing fact sheets, press releases, and other informational material
- arranging and participating in public, project review, and other meetings necessary for the CR process
- preparing graphics and/or visual aids for use at meetings
- upon submittal of the draft RI and FS, publishing notice of availability and supply analysis, establishing a 21-day comment period, conducting a public meeting, and maintaining meeting transcripts

- upon finalization of the RI and FS, publishing notice, forwarding RI- and FS-related documents to the Information Repository, and preparing the Responsiveness Summary

5.2 ANALYTICAL DATA QUALITY

Site-specific sampling and analysis programs for SI field investigations are summarized in Subsection 3.3. Analytical procedures appropriate for samples collected during the SI will comply with the USEPA Contract Laboratory Program (CLP) and standard USEPA methods, and will include analyses of both soil and water samples. The CLP was chosen for the analytical program at SCANGB because the data will be used to support future RI/FS studies. A combination of Target Compound List (TCL) volatile organic compounds, TCL semivolatile organic compounds, and Target Analyte List priority pollutant metals analyses will be performed on sediment, surface, and subsurface soil samples. Site-specific soil and groundwater analyses are listed in Table 3-8 of the SAP. Analytical methods for the SI are listed in Table 3-9 of the SAP; the SI analytical program is summarized in Table 3-8 of the SAP. Details of the ethylene glycol methodology are discussed in Appendix B of the SAP.

5.2.1 Data Quality Objectives

DQOs are based on the concept that different data uses may require different quality data (HAZWRAP, 1988). Data quality is the degree of certainty with respect to precision, accuracy, reproducibility, statements specifying the required quality of data needed to support RI/FS activities (including site screening), and characterization, and may be used to support engineering alternative evaluations and selection decisions. The five HAZWRAP levels of data quality used by Martin Marietta Energy Systems, Inc., in the RI/FS process are described in the ABB-ES Quality Assurance Project Plan (E.C. Jordan Co., 1989b) and the site-specific QAPP in Appendix B of this SAP.

Data from the SI at SCANGB will be used for several purposes, depending on the specific task and the medium of concern. DQOs for the SI are identified by medium as follows:

- Groundwater, sediments, and soil samples collected during the SI field program at SCANGB will be analyzed by CLP methods to provide Level D data.

- Soil gas samples will be analyzed in the field by FID-ECD/GC to provide Level B screening data for assistance in locating potential areas of contamination for placing test borings and monitoring wells.

- Screening samples will be analyzed in the field by PID-FID/GC methods to provide Level B data for optimizing well and boring placement.
- Air quality will be monitored by PID to provide Level A data.
- Temperature, pH, and specific conductance will be monitored in the field for groundwater samples to provide Level A and Level B data.
- Subsurface soils collected during drilling will be screened with a PID to provide Level A data.

Table 3-11 of the SAP presents DQOs for the SI analytical program that will be used at SCANGB.

5.2.2 Data Validation

Validation of the laboratory data is a systematic process to ensure that data are adequate for the intended use. The process includes the following activities:

- auditing measurement system calibration and calibration verification
- auditing QC activities
- reviewing data for technical credibility relative to the sample site setting
- auditing field sample data records and chain-of-custody
- checking intermediate calibration
- certifying the process

Data validation will be performed by ABB-ES personnel using USEPA procedures (USEPA, 1988a and 1988b). For analytical methods other than CLP, ABB-ES will conduct data reviews based on functional guidelines for laboratory blank contamination and laboratory QC.

HAZWRAP Level D QC, as described in "Requirements for Quality Control of Analytical

Samples of drummed drill cuttings will be collected and analyzed using Level D QA/QC. Level E is appropriate for analyses of contents of underground tanks, drums, pure waste samples, and other storage tanks where there is low probability of litigation.

QC during sample analysis is described by USEPA's CLP-Caucus Organic Protocol and CLP-Caucus Inorganic Protocol. QC for other aspects of the analytical program will be in accordance with USEPA guidelines for the analytical methods listed in Table 3-3 of the SAP.

5.2.3 Data Evaluation

Summary data from data validation will be evaluated, by media, to select the chemicals of potential concern (COPC). COPC are a subset of chemicals selected from site-related contaminants to be identified in the Contamination Assessment. The Contamination Assessment and Preliminary Risk Assessment process is discussed in detail in the accompanying SAP. Selection of COPC will be based on toxicity, concentration, frequency of detection, and potential routes of exposure. Selection criteria may also include comparison to background chemical concentrations or ARARs. Examples include the following:

- chemicals present in surface water at the base in concentrations above Clean Water Act levels and/or Federal Ambient Water Quality Criteria
- chemicals present in groundwater at the base at concentrations greater than USEPA MCLs, Maximum Contaminant Level Goals, or Health Advisories, all promulgated under the Safe Drinking Water Act
- chemicals present in soils and sediments at concentrations greater than site-specific background levels or above normal concentrations ranges for U.S. soils (Shacklette and Boerngen, 1984)

Data will be shown on maps characterizing distribution of contamination in the various media. Where appropriate, depth profiles of chemical concentrations will be included in maps and figures. The product of this assessment will be presentation of the spatial distribution of contaminants in each environmental medium and the identification and characterization of contaminant sources.

5.2.4 Applicable or Relevant and Appropriate Requirements

Section 121(d)(2)(A) of CERCLA specifies that remedial actions under CERCLA must meet any federal standards, requirements, criteria, or limitations that are legally applicable, or relevant and appropriate to the action. Such requirements are generally called ARARs. This subsection identifies potential ARARs for the work at SCANGB.

5.2.4.1 Use of ARARs in the Feasibility Study Process. Among other criteria, remedial alternatives must be selected that attain or exceed the designated ARARs. If a state requirement is more stringent than a federal requirement, the state requirement becomes the ARAR. Local regulations and ordinances are not ARARs, but may be considered when useful or necessary to protect human health and the environment.

According to USEPA's draft "CERCLA Compliance with Other Laws Manual," ARARs may be waived if one of the following circumstances exist (USEPA, 1988c):

- The RA selected is one part of a total remediation, and the final remedial activities will attain the ARAR.
- Compliance with the ARAR will result in a greater risk to human health and the environment.
- Compliance with the ARAR is technically impracticable.
- An alternate remedial action will attain the same performance.
- The ARAR is a state requirement that has not been consistently applied.
- Compliance will not provide a balance between environmental protection and availability of funds.

ARARs not only guide selection of a remedial alternative, but also serve as guidelines during development of a remedial design. During the SI, ARARs focus field investigations to collect data needed for the FS or remedial design. ARARs also provide guidance for conducting fieldwork in an environmentally sound manner.

5.2.4.2 Regulatory Guidelines for SCANGB. Regulations to be considered during SI work at SCANGB include requirements under the following statutes:

Federal Environmental Laws:

- RCRA
- Clean Water Act
- Clean Air Act

New York Environmental Regulations:

- Rules for Inactive Hazardous Waste Sites
- Water Quality Regulations
- Ambient Air Quality Standards
- Rules on Collection and Transportation of Industrial Wastes

Compliance with federal and state guidelines and policy statements is not required; however, these policies may be considered in the same way as local ordinances and regulations.

Specific applicable regulations for each listed statute are briefly described in the following paragraphs. Additional details on these requirements may be obtained by reviewing the cited statutes and regulations.

Resource Conservation and Recovery Act. Hazardous waste management regulations may apply to some sites to be investigated under the SI for SCANGB. Any materials excavated or removed from the sites that meet the definition of a hazardous waste would be regulated as such. Such materials would include cuttings, and contaminated soil and groundwater.

In 40 CFR Part 261, hazardous wastes are defined as solid wastes (under RCRA, a solid waste may have a solid, liquid, or gaseous physical state) with the following characteristics:

- ignitable (flash point above 140 degrees Fahrenheit)
- corrosive (pH of less than 2 or greater than 12.5)
- reactive (e.g., reacts violently with water and generates toxic gases)

- Extraction Procedure Toxicity (contains certain levels of heavy metals or herbicides)

Additionally, certain process wastes are known as "listed" waste and are identified specifically by a certain process.

When soils or groundwater meeting the definition of hazardous waste are excavated, pumped, or otherwise removed from the ground, it is considered hazardous waste generation which needs compliance with associated requirements for hazardous waste generators. These requirements, found in 40 CFR Part 262, include specifications for the storage of hazardous waste.

Hazardous waste must be disposed of at permitted treatment, storage, and disposal facilities. In 40 CFR Part 268, certain hazardous wastes, including solvent wastes; dioxin wastes; wastes with high cyanide, polychlorinated biphenyl, or halogenated organic compound contents; and many listed wastes from land disposal, are prohibited unless treatment is first conducted. Hazardous wastes generated at SCANGB must be evaluated based on 40 CFR Part 268 to ensure that any applicable land disposal restrictions are followed.

When hazardous waste is shipped off-site, the manifesting and transporting procedures of 40 CFR Part 263 must be followed. A base representative will sign all hazardous waste manifests as the generator of the waste.

Clean Water Act Requirements. The Clean Water Act will be applicable at SCANGB if, during the course of remedial activities, a discharge to surface waters occurs either directly or indirectly.

Applicable regulations may include National Pollutant Discharge Elimination System requirements and any water-quality-based effluent limit imposed on discharge into sanitary or storm sewers by the state.

Clean Air Act. During the SI, Clean Air Act regulations are not anticipated to be applicable to investigation activities.

New York Rules for Inactive Hazardous Waste Disposal Sites (6 NYCRR part 375). These rules apply to the development and implementation of remedial programs at inactive hazardous waste sites. These regulations generally conform to all federal requirements concerning site investigations at hazardous waste sites. Compliance with these requirements will be achieved through compliance with federal laws.

New York State Water Quality Regulations (6 NYCRR Parts 700-705). The New York Water Quality Regulations will apply at SCANGB if a direct or indirect discharge to surface water is to occur during remedial activities. An associated requirement might include regulations on State Pollutant Discharge Elimination System (6 NYCRR Parts 750-758).

New York Ambient Air Quality Standards (6 NYCRR Part 257). Impacts to air quality are not likely to result from investigation activities; therefore, these regulations are not applicable to the work proposed at SCANGB.

New York Rules on Collection and Transport of Industrial Wastes (6 NYCRR Part 364). These rules govern the collection, transportation, and delivery of hazardous and regulated waste. Off-site transport of hazardous materials, generated during the course of remedial activities, will be performed in accordance to these requirements.

6.0 INSTALLATION RESTORATION PROGRAM ACTIVITIES

The IRP consists of several activities, each with specific work elements designed to flow from a management plan to initial records searches to development and implementation of RA plans. The following list of activities are current and future activities associated with the IRP at SCANGB:

- Site Investigation
- Remedial Investigation
- Feasibility Study
- Remedial Design
- Technical Support
- Focused Feasibility Studies/Remedial Measures

Figure 6-1 shows the order of implementation and interrelationships of IRP activities.

6.1 PROJECT MANAGEMENT PLAN

A PMP will be prepared and updated biannually in each fiscal year that project work continues. This management plan will provide a comprehensive view of the technical and management approaches to be used for all tasks. The NGB will provide a generic CRP that will be modified by ABB-ES to accommodate specific conditions of this project. The NGB and base personnel will jointly handle public affairs. Technical support will be provided by ABB-ES for public affairs efforts on an as-needed basis. The management plan will include, at a minimum, the following:

- overview of IRP activities
- background information for the base
- site-specific information

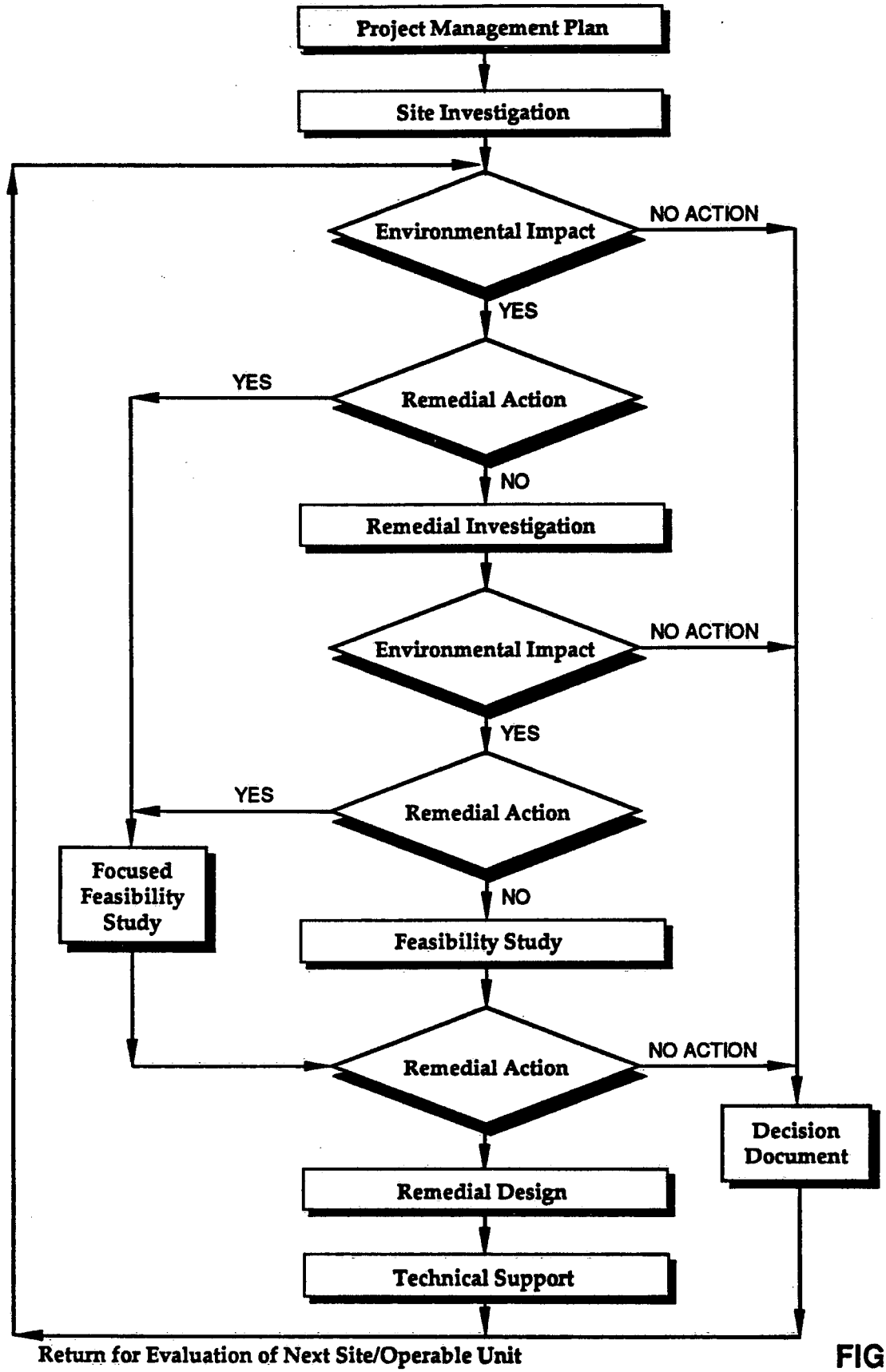


FIGURE 6-1
IRP ACTIVITY TASK RELATIONSHIPS
PROJECT MANAGEMENT PLAN
SUFFOLK COUNTY ANGB

ABB Environmental Services, Inc.

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- DQOs, ARARs, data evaluation
- baseline technical methodologies to accomplish project objectives
- program organization and management
- progress/status reporting procedures

6.2 SITE INVESTIGATION

This activity has the primary objective of confirming the existence of suspected contamination at the sites. Efforts will include evaluation of existing reports and data, preparation and implementation of a work plan, compilation and verification of analytical data, and preparation of an SI report. Following the conclusion of initial field activities, an assessment of the contamination status of each site will be initiated. A contamination assessment and risk assessment will be completed to support decision documents at sites where this action is an appropriate next step. The contamination assessment and risk assessment process to be used is described in detail in the accompanying SAP, and uses USEPA guidance (USEPA, 1987b, 1989a, and 1989b).

The SI report will be prepared and submitted to NGB, HAZWRAP, SCANGB, and regulatory agencies. The report, consisting of a summary of site activities and interpretation of data, will contain a hydrogeologic characterization of the site, a preliminary determination of the distribution and degree of chemical contamination, an assessment of potential receptors, and a risk characterization. Copies of field data, summaries of laboratory results, and other data generated during the SI will be included as appendices. If it is determined during the SI that sources other than those indicated in the SOW may contribute to downgradient groundwater contamination, they will be identified in the report. Recommendations for future IRP efforts will be provided.

6.3 FOCUSED FEASIBILITY STUDY/REMEDIAL MEASURES

Studies at federal facilities still follow the USEPA remedial RI/FS process and are consistent with the NCP; however, the ANG IRP has established procedures accelerating and streamlining the FS clean-up process. The application of FFS/RMs provides opportunities to initiate remedial activities at a site, or at a portion of a site, before initiation of the RI/FS process.

Site categories will be identified as part of the SI. Those meeting one or more of the following site conditions may undergo the FFS/RMs process based on the results of a preliminary risk assessment:

- site requires stabilization to prevent further site degradation
- a problem at the site precludes further investigation of site conditions
- a specific contaminant at the site can be handled most easily as a separate unit
- the site problem is exceedingly complex, with numerous source or migration problems

The FFS process can be initiated for any site during the SI process; therefore, SI activities will be directed toward instituting the FFS process when appropriate situations arise. The FFS/RMs process of the SI would be initiated by immediate written request from ABB-ES to the HAZWRAP Project Manager or by the NGB, asking for guidance on initiating an action. Initiation of the FFS process requires approval from governing authorities, including the New York Department of Environmental Conservation.

Each FFS will include an identification of remedial response objectives, the development of remedial measure alternatives, and a detailed analysis of remedial measure alternatives. A design will then be developed to implement the selected remedial measure.

6.4 REMEDIAL INVESTIGATION

Based on recommendations contained in the SI report, the RI work plan will be prepared to (1) support additional data-gathering requirements, (2) describe the scope and activities for the baseline risk assessment, and (3) outline the scope for the RI report.

The objectives of the RI field program are to (1) acquire data necessary to define the spatial distribution and magnitude of environmental contamination identified during the SI, and (2) develop a refined assessment of risks to health, welfare, and the environment associated with the identified contamination. A preliminary set of ARARs will be developed and used to help provide direction for RI field efforts.

To accomplish these objectives, the RI will (1) increase the environmental data base established during the SI to define the size and extent of contaminant sources, focusing on

areas shown to be downgradient of confirmed contamination, (2) characterize the hydrogeology and potential contamination of groundwater at SCANGB, (3) investigate the nature of groundwater movement in the area of SCANGB, and (4) develop a quantitative risk assessment.

The RI field program involves implementing an expanded set of activities similar to those proposed for the SI. The major difference is that data collection will focus on specific localities along identified flowpaths downgradient of the sites confirmed in the SI as having contaminants.

The RI report will include a summary and interpretation of data gathered during the RI and risk assessment. For each site, one of four recommendations will be made and supported: (1) take no further action or initiate long-term monitoring (DD required), (2) acquire additional data, (3) initiate preparation of engineering plans and specifications for removal of contamination (immediate removal), or (4) conduct an FS.

6.5 FEASIBILITY STUDIES

The general FS will be implemented if the recommendations of a risk assessment and RI report are to proceed with an FS for any site. The FS will be performed in accordance with USEPA guidance on FSs as modified by SARA and current NCP guidelines (USEPA, 1988d). To adequately focus the RIs, a preliminary set of ARARs, a list of potentially applicable technologies, and any site-specific data needs will be identified. Applicable technology review, development of preliminary response objectives, and review of ARARs will be coordinated with the risk assessment and RI report development. These activities will support appropriate remedial design, FS, or no further action or monitoring recommendations. FS activity will start during the RI.

Preparation of the FS will support alternatives analysis to evaluate the complete extent of remediation of soils and mitigation of groundwater contamination. The following chronology outlines the scope of the FS:

- screen, develop, and evaluate control measures
- screen control measures
- develop detailed alternatives

- evaluate detailed alternatives
- produce an alternative evaluation report
- conduct briefings on the alternative evaluation
- describe the selected alternative
- provide environmental and public health risk assessments
- produce an FS report

The final FS report will be available for a 60-day period for public review and comment.

6.6 REMEDIAL DESIGN

Included in this activity are the production of a final design package and assistance during the bid phase. Included in the design packages will be the following: engineering drawings and technical specifications; detailed construction estimates; HASP requirements; field and analytical QA/QC requirements; identification of required permits; a schedule for implementation; and additional components of the construction bid package, as may be required by SCANGB. Each design package will go through three drafts, the first after approximately 30 percent completion, the second after 60 percent completion, and the third at the 95 percent completion point. After review and approval, necessary minor revisions will be made and the construction estimate finalized.

Part of this activity includes assistance to the Base Contracting Office and other base personnel during preparation of bid documents, solicitation of proposals, and evaluation of responses by contractors.

6.7 TECHNICAL SUPPORT

Technical support during the construction or remediation phase will be provided to accomplish the following:

- ensure compliance with design documents

- provide additional site investigation
- provide engineering design for needed changes due to unexpected site conditions, or to bring the site into compliance with remedial response objectives
- provide services as needed for long-term environmental monitoring programs to measure air, surface water, and groundwater quality

During this phase, appropriate logs will be maintained, progress reports will be produced periodically, and a final report generated at the conclusion of discrete activities.

6.8 ACTIVITY RELATIONSHIPS

In all, eight IRP activities are to be implemented; two have been completed and six remain to be done. Six have been described in Subsections 6.1 through 6.6. This subsection contains an overview of the flow of activities as well as the intermediate decision points where changes in the normal flow can be initiated. Figure 6-1 graphically represents the sequence of activities.

The first task is the PMP (see Figure 6-1). For SCANGB, the records search performed by HMTC provided much information included in the PMP.

The SI is the next effort to be undertaken and the first that will provide data from field explorations which can form a basis for confirming the presence (or absence) of contamination. Figure 6-1 shows that the first opportunity to evaluate a site and make decisions regarding the need for further actions occurs after SI field activities.

In keeping with the need to remediate quickly where feasible, and to eliminate sites through the DD process (supported by a risk assessment) process, two questions can be asked when SI data become available. The first is whether an environmental or public health impact has been created by contamination at this site. If the answer is negative, a DD can be prepared. Upon an affirmative answer, a second issue arises concerning the existence of an RA to correct all or part of the problem. If the answer is affirmative, then an operable unit(s) can be identified and the FFS/RMs process initiated.

If neither a DD nor the FFS/RMs process can be initiated because more information is needed for the site, then an RI is the next activity. The RI is designed to quantify the

contaminant problem. Upon completion of, or during, the RI, the same decision process from the SI is used; the two questions regarding risk and remedial action will be asked again as data are obtained from field explorations. The DD and FFS/RMs processes can be proposed and implemented as appropriate.

An FS will be implemented for a site when data from RI procedures allow recommending remedial actions and are adequate to support a risk assessment and selection of remedial alternatives. Further RI work will be recommended if data are not adequate to support either the site write-off, the risk assessment, or the FS process.

Remedial Design follows from the selection of a remedial alternative, the key objective of the FS process. Upon completion of the design package for remediation, and support for the contractor bid process for the actual work, Technical Support (i.e., the provision of construction-related services) remains as the last activity to be accomplished.

This sequence of activities is followed again for other sites if necessary. For SCANGB, it is anticipated that sites will be in various stages of the program, with some undergoing continuing investigation and others having advanced to the remediation process. The intent is to expeditiously move sites through IRP activities to a resolution (either a DD or an RA).

7.0 PROJECT MANAGEMENT

The keys to successful implementation of IRP activities are (1) the development of an appropriate organizational structure, (2) the selection of qualified, decision-making technical and management personnel for leadership roles, and (3) the use of appropriate support mechanisms allowing the planning and scheduling of tasks and continual monitoring and control of all activities. ABB-ES's management approach for the program at SCANGB includes a structure providing for appropriate personnel and, through the use of the contract administration group, the means whereby monitoring and reporting of costs and schedule variances are accomplished in an accurate and timely manner. The following subsection describes in more detail the ways in which ABB-ES will meet project needs.

7.1 ORGANIZATION

The ABB-ES organizational structure for activities to be performed for SCANGB (Figure 7-1) maintains the basic elements that have been applied successfully at more than 15 bases in ABB-ES's IRP efforts. The Task Order Manager (TOM) is the focal point of the structure and is responsible for all activities. He is responsible to five different groups: three internal (the Corporate Officer, Program Manager, and Technical Review Committee) and two external (the HAZWRAP Project Manager and the NGB).

The TOM is supported by a Contracts and Administration Manager and Quality Assurance Manager. Reporting to the TOM is the Technical Director for the SI program, or SI Leader. The organization supporting the SI Leader includes a chemist to evaluate and manage analytical samples and data received from the laboratory, an Operations Leader for the field efforts, and a person to address public health and environmental impact concerns through the preliminary risk assessments.

7.2 PERSONNEL

The following subsections describe the key roles and individual team members of the project personnel.

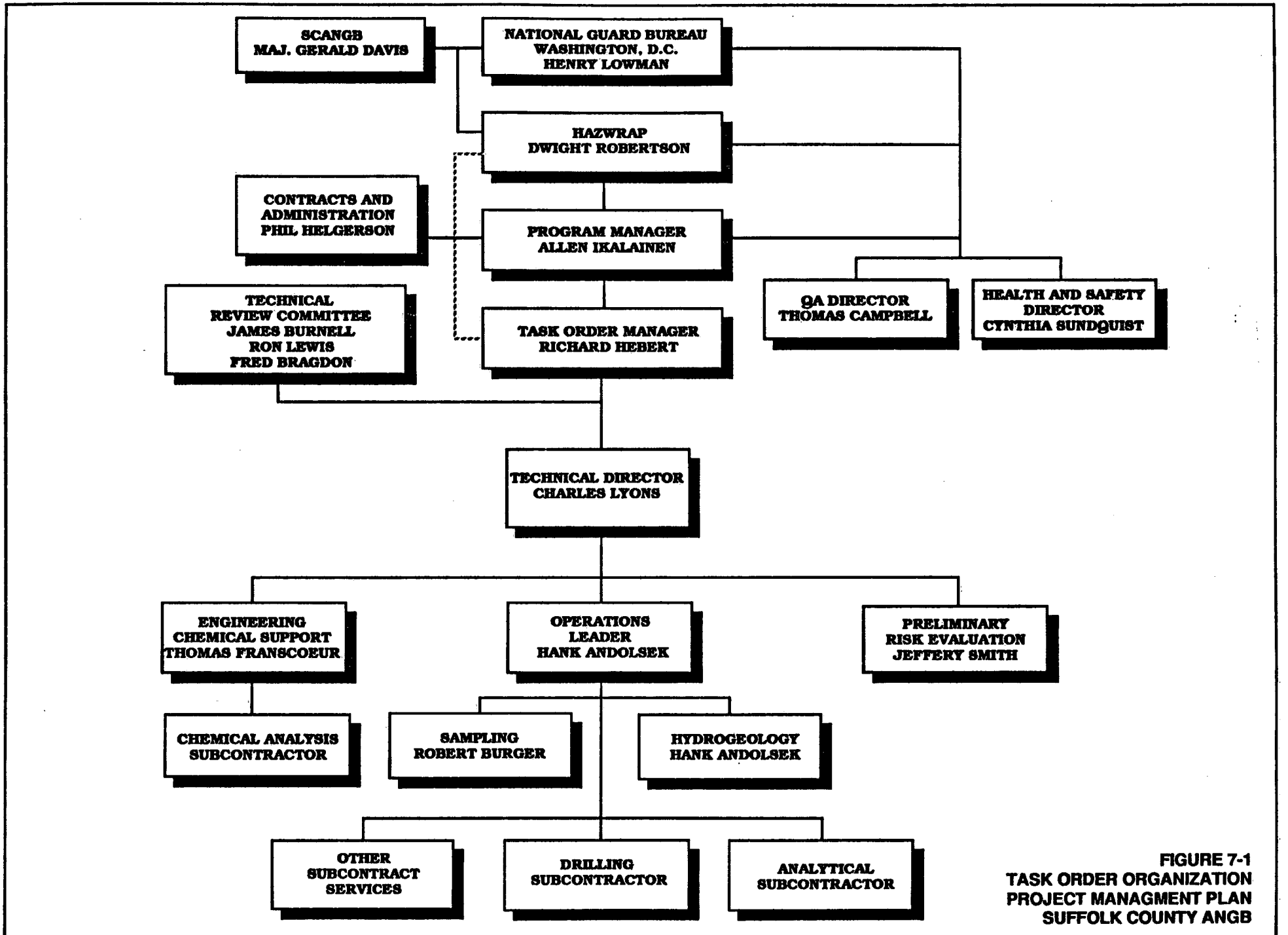


FIGURE 7-1
TASK ORDER ORGANIZATION
PROJECT MANAGMENT PLAN
SUFFOLK COUNTY ANGB

7.2.1 Key Roles

Personnel selected to fill key positions for the SCANGB Task Order have acquired considerable experience with the IRP during ABB-ES's six-year involvement. Each key individual is familiar with the working relationships between the NGB and HAZWRAP, and among the NGB and regulatory agencies; it is important that these relationships be understood and maintained if programs are to be successful. The key roles for SI work at SCANGB are designated in the following paragraphs.

Corporate Officer. The Corporate Officer is William R. Fisher, P.E., a vice president of ABB-ES. He is responsible for committing the corporate resources necessary to conduct program work activities, for supplying corporate-level input for problem resolution, and for assisting the Program Manager and TOM as needed in project implementation.

Program Manager. The Program Manager, Allen Ikalainen, P.E., is responsible for overseeing and managing the overall multi-installation IRP program for the northeast region. In this position, Mr. Ikalainen is able to perceive overall program needs, to promote technology and other information transfer among various IRP projects, and to direct resources as appropriate for effective and timely completion of program activities.

Task Order Manager. The TOM for the SCANGB Task Order is Richard Hebert. He is responsible for evaluating the appropriateness and adequacy of the technical or engineering services provided for the Task Order, and for developing the technical approaches and levels of effort required to address each SAP task. He also is responsible for the day-to-day conduct of the work, including integration of supporting disciplines and subcontractors (i.e., field investigation, drilling, and laboratory subcontractors). Mr. Hebert will be reviewing the ongoing QC during performance of the work, the technical integrity of conclusions and recommendations, and the clarity and usefulness of all project work products.

Some specific responsibilities of this role include the following:

- overall technical responsibility for the project
- initiation of project activities
- participation in SAP preparation and staff assignments
- identification and fulfillment of equipment and other resource requirements

- oversight of task activities to ensure compliance with established budget, schedules, and scope of work

- regular interaction with HAZWRAP and NGB representatives, the Corporate Officer, and others, as appropriate, regarding project status

Technical Review Committee. The Technical Review Committee has been chosen carefully, with both technical background and program experience as criteria. A committee consisting of senior technical staff from the ABB-ES team will assist the TOM by reviewing the technical aspects of the project to ensure that services reflect the accumulated experience of the firm, are produced in accordance with corporate policy, and meet the intended needs of the IRP team. The primary function of the committee is to ensure the application of technically sound methodologies and development of litigation-defensible data, interpretation, and conclusions. Frederick Bragdon, Ronald Lewis, and James Burnell will comprise the Technical Review Committee. ABB-ES believes this involvement to be appropriate and essential for maintaining quality throughout the project.

Quality Assurance and Health and Safety Director. The TOM is supported by a QA Coordinator and an H&S Coordinator. These staff-level positions will report to the QA Director and H&S Director, respectively, as well as the Corporate Officer and the Program Manager. Deborah Smith will serve as the QA Coordinator for this Task Order. The QA Coordinator will ensure that appropriate IRP and USEPA protocols are followed on the SCANGB Task Order and will be responsible for the development of the Quality Assurance Plan. The QA Coordinator also works with the Program Manager/TOM to ensure that established QC procedures are implemented. Meg Capasse will serve as the H&S Coordinator. On-site conformance with safety protocols will be ensured by periodic site visits by Ms. Capasse and through day-to-day supervision by the leaders of the site characterization activities. The H&S Coordinator is responsible for ensuring that the project team complies with the company's HASP when conducting site operations. She is also responsible for seeing that the HASP is developed for the implementation of selected alternatives.

7.2.2 Team Members

Key positions in this Task Order are the administrative and technical activity leaders (i.e., the senior and/or most experienced individual in each administrative-technical area of the project). These activity leaders, as shown in the Organization Chart, are described in the following paragraphs (Figure 7-1).

Contracts and Administration Manager. The staff-level position of Contracts and Administration Manager is established because of the importance of day-to-day scope, schedule, and budget monitoring for the SCANGB Task Order, both within ABB-ES and between ABB-ES and the IRP team. It is expected that program decisions will occur frequently. Therefore, it is necessary to anticipate and immediately implement administrative actions (i.e., initiate internal work orders, follow up on support needs, amend subcontracts, and track costs) to carry out the program plans. To achieve maximum efficiency and timeliness of response, Phil Helgerson will be responsible for these areas for ABB-ES through the TOM and will be a principal communications link with the client for these areas. Mr. Helgerson will be responsible for the following specific tasks:

- establishing and overseeing all subcontracts for support services
- preparing monthly technical/management/cost progress reports
- ensuring that appropriate financial records are maintained and that reporting requirements are met

Site Investigation. Charles Lyons, C.G., will be the Technical Leader for all site investigation studies. He will be responsible for all field explorations and groundwater and surface water studies with support from the Operations Leader and Richard Allen, Manager of Geophysics. Also, he will be responsible for development of the RI work plan, if one is required.

Engineering Chemical Support. Thomas Francoeur will be responsible for all activities supporting the program in analytical areas, including laboratory analysis, sampling, and chemistry-related needs.

Risk Evaluation. Jeffrey Smith will be responsible for the contamination assessment and associated risk assessment activities.

Sampling. Robert Burger will be responsible for field sampling activities to support the program. His responsibilities include training of personnel, and maintenance and advancement of sampling technologies.

Personnel for each major task are listed in Figure 7-1. Resumes of all individuals, which discuss hazardous waste qualifications and experience, are in Appendix A.

Operations Leader/Hydrogeology. Hank Andolsek will be responsible for the execution of all field exploration and sampling activities. Also, Mr. Andolsek will provide technical support to the program as a hydrogeologist.

7.3 SUPPORT SYSTEMS

The following subsections discuss support systems for activities to be conducted at SCANGB.

7.3.1 Scheduling

Of particular importance in implementation of activities at SCANGB will be development and maintenance of detailed schedules. This will be accomplished using project management personal computer-based software. Using a computer to develop schedules for activities allows easy adjustment of plans. Schedules can be rearranged in the field (through the use of portable personal computers) when adverse conditions or situations prevent maintaining the current program path. The detailed schedule for SI activities, and key milestones and associated planned dates are contained in the SAP accompanying this PMP. The schedule for completion of major SI components is summarized in Figure 7-2.

7.3.2 Performance Monitoring and Control

ABB-ES's internal project accounting systems will enable fiscal performance reporting by appropriate structuring of cost resource data. The following reports used by ABB-ES's administrative group allow timely monitoring of manhours and expenditures accrued on a given project task and the total program.

Project Progress Report. This report is a weekly listing of the past week's labor charges by discipline and employee; it includes job-to-date charges, planned charges, and backlog information (i.e., variances). The project progress report also includes a summary of current direct charges, as well as job-to-date direct charges, planned expenditures, and variances. Periodic reporting by the administrative group to the TOM and individual Task Leaders will allow timely analysis of fiscal problems and implementation of corrective actions.

7.3.3 Progress Reporting

Throughout the program, progress reports will be issued on a monthly basis. These reports will be provided by the TOM in cooperation with the task and subtask leaders. Technical progress and fiscal status support will be provided by contract and administration personnel.

The progress report will use the following outline:

A. Summary

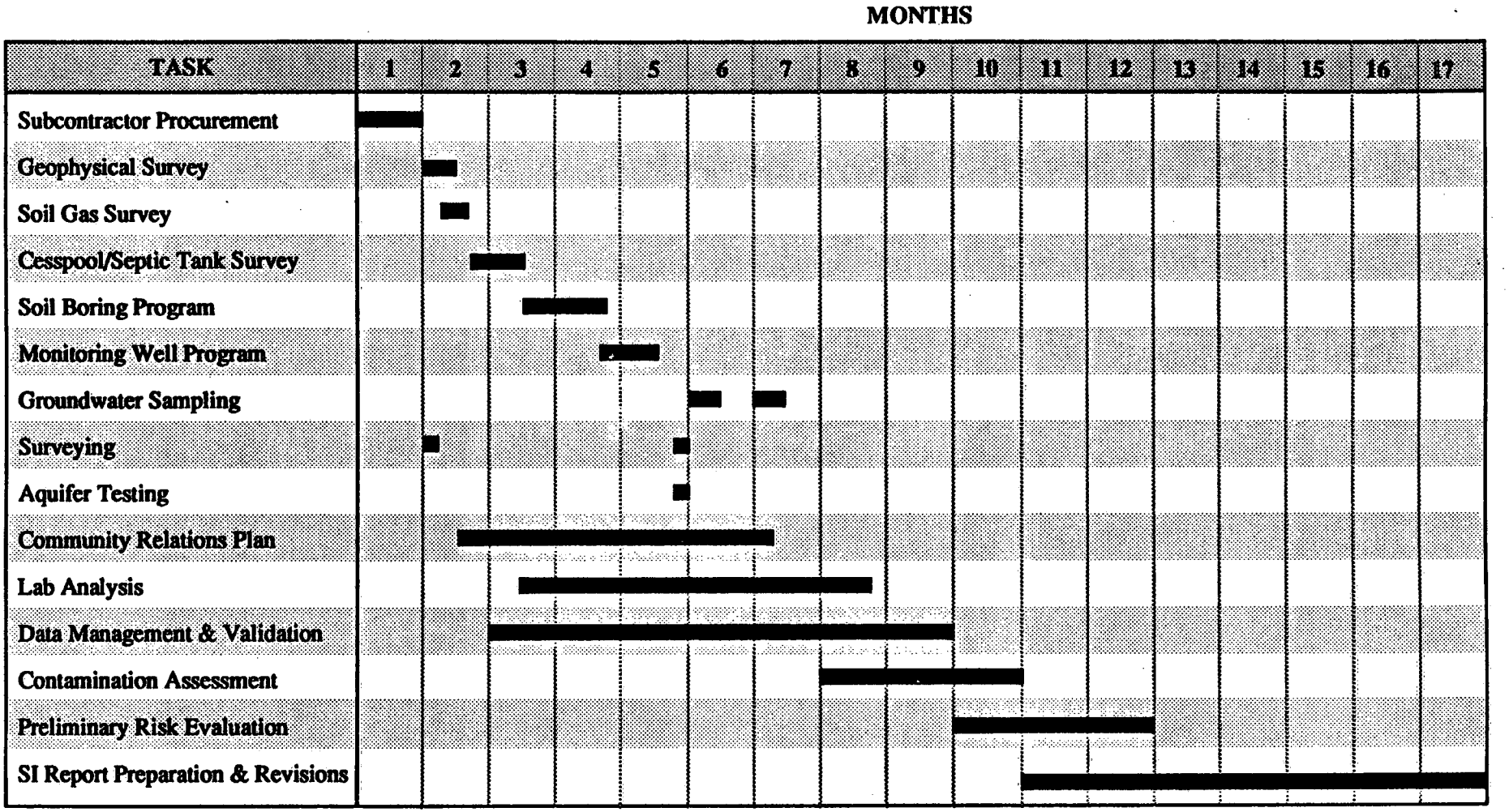
B. Financial Status

C. Individual Site/Task Status

- Accomplishments
- Problems

D. Project Milestone Dates

E. Future Deliverable Dates



NOTES: BES = Basewide Exposure Scenario

CRP = Community Relations Plan

FIGURE 7-2
SITE INVESTIGATION SCHEDULE
PROJECT MANAGEMENT PLAN
SUFFOLK COUNTY ANGB

GLOSSARY OF ACRONYMS AND ABBREVIATIONS

ANG	Air National Guard
ARAR	Applicable or Relevant and Appropriate Requirement
AVGAS	aviation gasoline
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CLP	Contract Laboratory Program
COPC	chemicals of potential concern
CR	Community Relations
CRP	Community Relations Plan
DD	Decision Document
DOD	Department of Defense (U.S.)
DOE	Department of Energy (U.S.)
DQO	data quality objective
FFS/RM	Focused Feasibility Study/Remedial Measures
FS	Feasibility Study
Site 6	Fire Training Area
GC	gas chromatography
HASP	Health and Safety Plan
HAZWRAP	Hazardous Waste Remedial Actions Program
H&S	Health and Safety
HMTC	Hazardous Materials Technical Center
IRP	Installation Restoration Program
MCL	Maximum Contaminant Level
NCP	National Contingency Plan
NGB	National Guard Bureau
PA	Preliminary Assessment
PID	photoionization detector
PMP	Project Management Plan
POL	petroleum, oil, and lubricants

GLOSSARY OF ACRONYMS AND ABBREVIATIONS
(Continued)

QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
RA	Remedial Action
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
SAP	Sampling and Analysis Plan
SARA	Superfund Amendments and Reauthorization Act
SCA	Suffolk County Airport
SCANGB	Suffolk County Air National Guard Base
SI	Site Investigation
SOW	Statement of Work
TCL	Target Compound List
TOM	Task Order Manager
USEPA	U.S. Environmental Protection Agency

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Dames and Moore, 1986. "Phase I Records Search for Suffolk County Air Force Base (Retired), Suffolk County Airport, Westhampton Beach, New York"; Preliminary Draft; September 18, 1986.

E.C. Jordan Co., 1989a. "Final Site Characterization Report - Suffolk County Airport Fire Training Area, Westhampton Beach, New York"; prepared for the Hazardous Waste Remedial Actions Program; Oak Ridge, Tennessee; June 1989.

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APPENDIX A

RESUMES

RICHARD P. ALLEN, Manager, Geophysics

QUALIFICATIONS SUMMARY

Mr. Allen is responsible for all geophysical exploration activities at E.C. Jordan. He has 15 years of experience in the application of a broad range of geophysical techniques used in support of engineering studies involving siting of landfills for the pulp and paper industry, the expansion of municipal landfills and the evaluation of sludge lagoons. He has also participated in remedial investigations conducted at hazardous waste sites and engineering studies. The geophysical techniques he is familiar with include seismic refraction, conventional (galvanic) electrical resistivity, terrain conductivity (inductive electromagnetics), magnetics, ground penetrating radar (GPR), and downhole logging. Much of his earlier training and experience was obtained through detailed geophysical/geological studies conducted for the nuclear power plant industry. More recently, his experience has focused on the application of geophysics in engineering studies as well as in remedial investigations conducted at various Superfund sites in the eastern and north-central United States.

EDUCATION

M.S./Geophysics, 1971, Boston College
B.S./Physics, 1967, Bowdoin College

HEALTH AND SAFETY TRAINING

In-house and field Health and Safety training, 29 CFR 1910.120.
First Aid Certification.

PROFESSIONAL AFFILIATIONS

Association of Engineering Geologists
Society of Exploration Geophysicists
Geological Society of Maine

RELEVANT EXPERIENCE

Site Suitebility Study For Landfill Expansion, Scott-Somerset Plant, Skowhegan, ME--A geophysical survey was conducted to evaluate the suitability of a 60-acre parcel for the expansion of a sludge and ash landfill. Seismic refraction measurements were used in conjunction with resistivity soundinging and terrain conductivity profiling to evaluate the depth to bedrock, the depth to the water table, and the presence of sandy till deposits within the study area. The results were used for planning purposes and to locate monitoring wells and test pits. Mr. Allen designed and implemented the study and was responsible for interpreting and presenting the results.

Remedial Investigation/Feasibility Study (RI/FS) at the Rose Township Dump; Rose Township, Michigan--Approximately 5,000 barrels of industrial wastes were deposited in a 70-acre field at the site between 1966 and 1968. Site inspections in 1978 revealed that there were many rusted and leaking drums containing a variety of chemical waste products. Many of these drums were subsequently removed and disposed. E.C. Jordan was retained in 1984 to conduct a RI/FS. Mr. Allen conducted a geophysical survey to determine if there were any buried drums on the property which had previously gone undetected. A combined metal detector/magnetometer survey was completed and no additional barrels were discovered in the subsurface thus assuring that all known sources of contamination had been considered in the remedial alternatives.

Hydrologic Investigation for a New England Semi-conductor Manufacturer--Improper handling of solvents used in the manufacturing of semi-conductor components prompted the manufacturer to retain E.C. Jordan to assess groundwater and surface water conditions at the site. A seismic refraction survey was conducted by Mr. Allen to determine preferential pathways for contaminant flow in groundwater beneath the site. Results

from the geophysical survey were used to guide the placement of downgradient monitoring wells and to provide boundary conditions for groundwater modelling studies.

Site Investigation at the 80-acre Metamora Landfill Site; Lapeer County, Michigan--Operating from 1966 as an unregulated open dump, the landfill received general refuse and drummed industrial and chemical wastes until its closure in 1980. Elevated concentrations of contaminants in the groundwater, which is the primary source of potable water for the area, prompted the Michigan Department of Natural Resources to retain E.C. Jordan to conduct a site investigation and phased feasibility study for a source control operable unit. Due to extremely difficult drilling conditions, an extensive geophysical survey was designed by Mr. Allen to fill in data gaps between widely-spaced monitoring wells. The survey consisted of 20,900 feet of seismic refraction profiling to depths of up to 400 feet, 57 vertical electrical soundings using the Wenner electrode configuration ("a"-spacings of up to 800 feet), and a detailed magnetometer survey within an area where previous reconnaissance had revealed the possibility of a large barrel repository. The geophysical survey permitted a better understanding of the geologic environment and confirmed the presence of the barrel repository which is presently being excavated.

Remedial Investigation/Feasibility Study at the Saco Tannery Waste Pits; Saco, Maine--The 215-acre site, which operated from 1959 to 1977, is highly ranked on the U.S. EPA National Priorities List due to the disposal of (tanning) process wastes and the threat to local residents through groundwater contamination. Mr. Allen was responsible for the design and data acquisition of a geophysical program to evaluate contaminant migration pathways in groundwater. A combined program of seismic refraction and terrain conductivity measurements was implemented, the results of which were used to optimize the locations for monitoring wells.

Sludge Landfill Siting Studies For Crown Zellerbach, Carthage, NY-- Reconnaissance seismic refraction surveys were performed at several sites to determine the thickness of lacustrine clay deposits which would prevent the vertical migration of leachate. These studies quickly demonstrated the suitability of two of the three sites and permitted optimum placement of confirmator test borings.

Site Investigation At A Sludge Lagoon To Determine The Presence Of Buried Drums--A magnetometer survey was conducted at a sludge lagoon belonging to a major paper manufacturer in north-central new York where drums were suspected to have been disposed. The Study was conducted in the winter months when the surface of the ten-foot deep lagoon was frozen. Magnetic contour maps over the 10-acre lagoon tergeted two anomalous magnetic zones near the perimeter of the lagoon. Mr. Allen was responsible for the design and implementation of this work.

ADDITIONAL EXPERIENCE

Mr. Allen has managed and participated in more than 300 projects requiring the application of geophysics. Surveys have ranged from small municipal water supply studies to large multi-disciplined field efforts requiring the use of several geophysical techniques. He has been involved in all phases of geophysical field studies, from the planning stages to the interpretation of field data and preparation of the final report.

ROBERT HENRY ANDOLSEK, Hydrogeologist

EXPERIENCE SUMMARY

Mr. Andolsek has five years of hydrogeologic consulting experience and has worked on over seventeen sites with projects conducted at the industrial, State and Federal level. He has gained experienced with all phases of remedial investigations of uncontrolled hazardous waste sites. Mr. Andolsek has supervised drilling and sampling procedures at uncontrolled hazardous waste sites, developed and conducted aquifer tests and prepared technical reports. He has gained experience in aquifer analysis, geophysical methods and ground water modeling.

SPECIALIZED SKILL AREAS

Geohydrology
Remedial Investigations
Data Analysis
Bore Hole Logging
Groundwater Modeling

EXPERIENCE

ABB ENVIRONMENTAL SERVICES, INC., Portland, ME, February 1991 - present
Hydrogeologist 1991 - Present

Kingsbury Landfill, Kingsbury, NY, (NYDEC). As a site hydrogeologist, Mr. Andolsek assisted with the execution of back-to-back 72-hour pumping tests. In the office, he was responsible for the data analysis and associated technical report.

McGuire Air National Guard Base, Wrightstown, NJ (Martin Marietta Energy Systems). Mr. Andolsek supervised monitoring well installation and screened auger sampling at several sites on the base.

CAMP DRESSER AND MCKEE, INC., New York, NY, January 1990 - January 1991
Project Hydrogeologist 1990 - 1991

Pfohl Brothers Landfill, Cheektowaga, New York (NYSDEC). As project hydrogeologist, Mr. Andolsek analyzed environmental sampling and hydraulic data generated during the Phase I remedial investigation, prepared technical reports and formulated the Phase II scope of work.

East Setauket Bulk Fuel Storage Site, East Setauket, New York (Northville Industries). Mr. Andolsek conducted analysis of a long-term pumping test in the multi-layered aquifer that was contaminated with hydrocarbons--results were used to calibrate a numerical flow and transport model.

Flow Augmentation Needs Study, Suffolk County, New York (Suffolk County, NY). Mr. Andolsek was charged with conducting analytical ground water flow modeling to predict the impact that proposed extraction wells would have on municipal supply wells.

CENTER FOR GROUND WATER MANAGEMENT,
WRIGHT STATE UNIVERSITY, Dayton, Ohio, June 1988 - December 1989
Graduate Research Assistant 1988 - 1989

Southwestern Portland Cement Landfill, Fairborn, Ohio (SPC Company). Mr. Andolsek was the principal investigator responsible for conducting the preliminary investigation including development and implementation of the sampling plan. Mr. Andolsek was charged with operating a Mobile B-47 auger drilling rig, collecting split spoon samples, analyzing the data and preparing the technical report and monitoring plan.

Sycamore Farm Experimental Watershed, Dayton, Ohio (Ohio Board of Regents/WSU). As principal investigator, Mr. Andolsek was responsible for conducting the hydrogeologic characterization of the site, developing a work plan and coordinating the site investigation. As part of his duties, Mr. Andolsek operated a Mobile B-53 rotary drill rig, collected over 400 feet of NX rock core, installed eight monitoring wells, designed and constructed inflatable packers, designed and executed pumping and packer tests and utilized borehole and surface geophysical surveys. Mr. Andolsek analyzed the data and prepared the technical report.

CAMP DRESSER AND MCKEE, INC., New York, NY, January 1986 - June 1988
Geologist 1986 - 1988

Robintech Site, Binghamton, New York (USEPA). As project geologist, Mr. Andolsek developed an aquifer testing program and subsurface soil and water sampling procedures as part of a work plan. During the field investigation, Mr. Andolsek supervised hollow stem augering and split spoon sampling, performed well sampling and sample management, participated in aquifer testing and analysis and assisted with report preparation.

Port Washington Landfill Site, Port Washington, New York (USEPA). As a site geologist, Mr. Andolsek logged 200 hours in level B health and safety protective clothing, supervised mud rotary monitoring well installation, supervised hollow stem auger landfill gas well installation and performed sample management.

LiPari Landfill Site, Gloucester, New Jersey (USEPA). As the project geologist, Mr. Andolsek was responsible for supervising the installation of injection and monitoring wells, assisting with a 72-hour injection test and assisting with the preparation of a long-term monitoring plan. During the field investigation Mr. Andolsek logged 400 hours in level B health and safety protective clothing.

DOWN EAST DRILLING, INC., Barrington, NH, September 1985 - November 1985
Drilling Assistant 1985 - 1985

Mr. Andolsek assisted air rotary well drilling contractor with the installation of residential and environmental monitoring wells.

EDUCATION

M.S./Hydrogeology, 1990, Wright State University
B.S./Geology, 1985, Edinboro University of Pennsylvania

PROFESSIONAL AFFILIATIONS

American Geophysical Union
National Water Well Association

PUBLICATIONS/PRESENTATIONS

"Investigation of Non-Point Ground-Water Pollution at the Sycamore Farms Experimental Watershed," (abs.), *EOS, Transactions of the American Geophysical Union*, 70(43), p.1089.

"Advective fluid transport in the subsurface saturated zone at Sycamore Farm Experimental Watershed," (abs.), *The Ohio Journal of Science*, Volume 90(2).

FREDERICK F. BRAGDON, Senior Consultant, Geology

EXPERIENCE SUMMARY

Mr. Bragdon has more than eighteen years of experience years of experience in siting of special/hazardous waste disposal sites, contamination assessment studies, remedial action assessment and long-term environmental monitoring. His areas of expertise include geotechnical reconnaissance, surficial geologic mapping, rock fracture and permeability studies, subsurface soils investigations, and air-photo interpretation. He has performed fracture and lineament analysis, floodprone area identification, and aquifer, surficial and bedrock geologic mapping utilizing low-level and high-altitude (U-2) black and white, infrared and color photography. Mr. Bradgon was involved in the Northeastern Regional Geologic Characterization studies for screening and selection of high level radioactive waste disposal sites. He is currently involved in the development of methodology to perform statewide screening to select sites for the storage/disposal of low level radioactive waste for the State of Maine.

As Senior Consultant, Mr. Bradgon is responsible for senior geological oversight and technical review. He also participates in Quality Assurance Audits of field activities.

SPECIALIZED SKILLS AREAS

- Air Photo Interpretation
- Site Search (Waste Disposal)
- Site Investigations
- Surficial and Bedrock Geologic Mapping
- Geology/Geohydrology
- Low/High Level Radioactive Waste
- Monitoring Well Design and Installation

EXPERIENCE

ABB ENVIRONMENTAL SERVICES, INC., Portland, ME. 1973 - present
Senior Consultant, Geology 1989 - present
Senior Geologist 1983 - 1989
Geologist 1973 - 1983

Maine Waste Management Agency, Special Waste Landfill Site Selection, Augusta ME. 1990 - present.--Mr. Bragdon is responsible for senior oversight of geologic evaluation and methodology development. Geologic and pedologic data is being utilized to screen two regions of the state to select approximately six potentially suitable sites for more detailed geologic/geohydrologic investigation. Two sites will be eventually selected for ash disposal.

Maine Low-Level Radioactive Waste Authority, Site Screen for a LLRW Disposal/Storage Facility in Maine, Augusta, ME. 1988 - present.--Mr. Bradgon is currently involved in the development of methodology to perform statewide screening to select sites for the storage/disposal of low level radioactive waste for the state. The screening process, utilizing exclusion, avoidance and fundamental performance data mapping, has presently selected ten regions for more detailed screening.

USATHAMA, Remedial Investigation Badger Army Ammunition Plant, Baraboo, WI. 1989 - present.--Mr. Bragdon is responsible for senior oversight of geologic evaluation of the area. The geologic data is currently being utilized in the identification of source areas and the assessment of level, concentration, and migration of chemicals from areas of past activity and disposal.

U.S. Department of Interior, Environmental Assessment of Alternate Routes, Dickey-Lincoln School Lakes Transmission Line, Environmental Impact Statement Project, Geotechnical Study. 1977 - 1978.--Mr. Bragdon was the Technical Manager on this project. Geotechnical data was identified, mapped, described and analyzed along the proposed transmission corridor, microwave tower and substation sites associated with the Dickey-Lincoln School Lakes project. An assessment of the environmental impact of the proposed action related to the geotechnical variables was made in terms of construction, maintenance and operation. The geotechnical data was developed both from existing available information and the interpretation of recent low-level color, and black and white aerial photographs. A continuous map of the surficial geologic material along the one-half mile wide right-of-way for each link from Fort Kent, Maine, to Essex, Vermont was prepared from the assembled data.

Martin Marietta Energy Systems, Inc., Site Characterization/Remedial Action Plan for Former Landfill and Adjacent Pesticide Burial Site Stewart Air National Guard Base, Newburgh, NY. 1987 - present.--The objective of this project is to characterize the former landfill, to evaluate contaminant migration pathways and monitor the Pesticide Burial Area after simple clean-up. Mr. Bragdon is the Task Order Manager responsible for the Remedial Investigation and Feasibility Study of these sites.

U.S. Department of Energy, Screening and Selection of High-Level Radioactive Waste Disposal Sites, Northeastern Regional Geologic Characterization. 1983 - 1985.--Mr. Bragdon was the Task Leader responsible for the Quaternary and Economic Geology chapters of the Characterization phase of the study. The Quaternary data was used to project past glacial process to future performance of the granite repository. The economic study identified the location of past and present economically significant mineral locations with the planning of the repository location.

USEPA Region I REM III Program, Remedial Investigation Saco Tannery Waste Pits Site, Saco, ME. 1987 - 1990.--Mr. Bragdon contributed senior oversight to the geologic evaluation and directed the use of remote sensed data for the analysis of fracture traces to assess potential contaminant migration.

NYSDEC, Borehole Program (Task 5A) at Love Canal, Niagara, NY. 1983 - 1985.--Mr. Bragdon was responsible for the geologic evaluation of the canal area. The geologic data was utilized in the assessment of level, concentration, and migration of chemicals from the canal.

Central Maine Power, Remedial Investigation/Feasibility Study, F. O'Connor Site; Augusta, Maine--Mr. Bragdon was responsible for senior oversight of the geologic evaluation and analysis of remotely sensed data. The fracture trace data was used to assess potential PCB contaminant migration from the transformer-recycling and salvage yard.

Boston Edison Company, Site Contamination Audits, Everett, MA. 1980 - 1982.--Mr. Bragdon has performed several site contamination audits for Boston Edison prior to purchase. The industrial sites were formerly used for chemical production and petroleum storage.

Crown Zellerbach Corp., Landfill Site Screening Study, South Glens Falls, NY. 1984 - 1987.--The objective of this study was to conduct a preliminary screening of a 20-mile radius area around the South Glens Falls mill to identify potential sites for a landfill with a 20-year capacity. Nine preferred site were identified from 37 potential areas. Mr. Bragdon was responsible for the screening and selection of preferred sites.

Crown Zellerbach Corp. and Boise Cascade Corp.; Landfill Site Screening Study, Carthage and Beaver Falls, NY. 1985 - 1987.--Mr. Bragdon was responsible for senior oversight for developing the screening criteria and conducting the screening process. Three sites were selected for recommendation to the clients for preliminary subsurface investigation.

Schoeller Technical Papers, Inc., Landfill Site Screening and Selection Study, Pulaski, NY. 1986 - 1988.--This study was conducted to identify and determine the relative suitability of potential landfill sites in accordance with the New York State Department of Environmental Conservation. The report recommended that a suitable landfill site be developed on the mill owned property, Mr. Bragdon was the task leader for this project.

Lincoln Pulp and Paper Company, Landfill Site Screening Study, Lincoln, ME. 1987 - 1990.--Mr. Bragdon contributed senior oversight for the preliminary screening of the area within a 10-mile radius of Lincoln's mill. The study process narrowed the number of identified sites from 56 to 31 to 17 and eventually proposed five sites to the client for serious consideration.

ADDITIONAL EXPERIENCE

Mr. Bragdon taught geology at Unity College in Unity Maine, Western Connecticut College in Danbury, and the University of Maine at Orono between 1963 and 1973. During this period, he was involved with quaternary and glacial geologic studies in Alaska and Maine for the Arctic Institute of North America and the Quaternary Institute of the University of Maine.

EDUCATION

M.S./Geology, 1963, University of Wyoming
B.A./Geology, 1960, University of Connecticut

ADDITIONAL COURSEWORK

Quaternary Geology, 1970-1972, University of Maine

PROFESSIONAL LICENSES

1974 Certified Geologist - Maine

PUBLICATIONS/PRESENTATIONS

"Surficial Geology of the Lower Penobscot River Study Area," Penobscot River Study Volume 1, Technical Report No. 1, University of Maine at Orono, Environmental Studies Center, Geology Consultant for the project.

"Surficial Geology of the Penobscot Bay Area," Coastal Planning Office, Augusta, Maine, co-authored with Dr. Harold W. Borns, and information from Dr. Glen C. Prescott.

"Surficial Geology of the Coastal Towns in Knox County," Coastal Planning Office, Augusta, Maine, co-authored with Dr. Harold W. Borns.

"Engineering Applications of Remote Sensing Data," presented to Landfill Disposal of Pulp and Papermill Sludges Conference, 1978, University of Maine.

"Site Selection for Sludge Disposal," presented to Landfill Disposal of Pulp and Papermill Sludges Conference, University of Maine, 1978.

"Design and Development of a Sludge Landfill," Technical Association of Pulp and Paper Industries, 1979 Annual Meeting Proceedings, with S.R. Cooper, NY, NY, 1977.

"Geotechnical Aspects of Site Selection," presented to Landfill Disposal of Pulp and Papermili Sludges Conference, University of Maine.

"Two Tills in Northern Maine," The Maine Geologist, Vol. 8, No. 2, (December 1981). (Co-authored with William R. Holland.)

ROBERT M. BURGER, Manager, Environmental Monitoring

QUALIFICATIONS SUMMARY

Mr. Burger's areas of expertise include field monitoring and sample collection program design and implementation, field data collection, laboratory analysis selection and QA/QC requirements and protocols, pollutant characterization, data and statistical analysis, sample collection equipment design and deployment, and health and safety program design. His project management activities have been with program design and implementation of field investigations as they relate to field sample screening and collection and on-going contamination detection programs for industrial and municipal clients.

EDUCATION

American Chemical Society Short Course, "Environmental Chemistry of Groundwater", September 1986
NWWA Short Course "Design, Installation, and Sampling of Groundwater Monitoring Wells", July 1984
A.A.S./Civil Technology, 1972, State University of New York at Delhi

RELEVANT EXPERIENCE

ACME Superfund Site; Mooristown, Illinois--Mr. Burger established procedures and collected ambient air samples at the site for field screening of volatile organics for health and safety considerations.

Plattsburg Air Force Base; Plattsburg, New York--Mr. Burger designed and implemented a soil gas investigation program for subsurface soil gas contamination delineation. The field samples collected were analyzed on-site using a mobile gas chromatograph.

Winthrop Landfill, EPA Superfund Site, United Technology; Winthrop, Maine--Mr. Burger directed the design and protocol development for the groundwater, surface water and sediment sampling programs. He was responsible for program design and implementation of a sediment screening program for volatile organics in a lake bed for determination of groundwater discharge locations. He designed and directed the use of specialized sampling equipment for low-level organics containment collection at discrete intervals in the lake. At this site, Mr. Burger also implemented an ongoing landfill gas monitoring program.

NYSEG, Court St. Coal Tar Vessels; Ithaca, New York--Mr. Burger designed and directed the collection of multiple phase samples from underground tanks for remedial investigation and ultimate disposal.

Brunswick Naval Air Station, U.S. Navy; Brunswick, Maine--Mr. Burger designed and directed the screening and sample collection program of an unidentified drum storage area for disposal purposes.

IRP, Massachusetts Military Reservation; Cape Cod, Massachusetts--Mr. Burger was responsible for sampling methodology, protocol development and implementation of groundwater monitoring program for diverse network of monitoring wells, including multi-level packer sampling for screening purposes. He directed multiple crews collecting over 100 groundwater samples within a week.

Cannons Bridgewater Superfund Site; Bridgewater, Massachusetts--Mr. Burger was responsible for methodology, protocol development of a groundwater, surface water and sediment sampling program for a remedial investigation. He designed and implemented a surface soil screening program using a field gas chromatograph.

Charles George Landfill, Superfund Site; Tyngsboro, Massachusetts--Mr. Burger designed and directed a program for the collection of groundwater samples from monitoring wells using inflated packers and a submersible pump for additional RI data.

JAMES R. BURNELL, PhD., Department Manager Installation Restoration Program

QUALIFICATIONS SUMMARY

Dr. Burnell's expertise lies in the areas of contaminant behavior in groundwater-rock systems, the interaction of engineered systems with the natural environment, and the management of multi-disciplinary projects. He has 14 years experience from the operational, national laboratory, corporate, and academic perspectives including investigations of inorganic and radioactive contaminant mobility, surficial and sub-surface geologic studies, geologic and geochemical site characterization.

SPECIALIZED SKILL AREAS

- Project Management
- Geology
- Bedrock Mapping
- Surface Soil Mapping
- Remedial Investigation
- Mixed Waste

EXPERIENCE

ABB ENVIRONMENTAL SERVICES, INC., Portland, ME. June 1988 - present
Department Manager Installation Restoration Program (IRP) September 1990 - present
Principal Scientist/Principal Project Manager June 1988 to September 1990

Dr. Burnell currently manages a 10-person department providing project management and support to large federal government programs (Installation Restoration Program) through HAZWRAP, USATHAMA, Army Corps of Engineers. In this role as Assistant Program Manager for HAZWRAP.

Maine Low Level Radioactive Waste Authority, Site Screening and Selection, Maine Low-Level Radioactive Waste Facility, February 1990 - present. Dr. Burnell is the project manager for ABB Environmental's effort to select an appropriate site for a low-level radioactive waste disposal facility for the state of Maine. With a team of subcontractors, ABB Environmental Services, Inc. (ABB-ES) is using a sophisticated Geographical Information System (GIS) to screen the entire state, progressively eliminating areas determined to be inappropriate. In addition to the technical aspects of the screening, which involve a wide variety of engineering, scientific, and socioeconomic factors, the project involves a large effort in dealing with the public, with anti-nuclear advocates, the media, and state government and regulatory bodies.

USATHAMA, Remedial Investigation/Feasibility Study, Sierra Army Depot, CA. February 1990 - present. Dr. Burnell serves as the project manager for this project assessing contamination at a variety of sites on this Department of Defense facility northwest of Reno, NV. Administered by the U.S. Army Toxic and Hazardous Materials Agency (USATHAMA), the project involves investigation and remediation of sites contaminated with fuels and fuel products, halogenated solvents, and explosive compounds in this desert environment. Five sites are being investigated in this phase, with a feasibility study completed on one of those - a site contaminated by explosive compounds in the soil and groundwater.

Martin Marietta Energy Systems, Inc. HAZWRAP Program, Remedial Investigation/Feasibility Study, Massachusetts Military Reservation, Cape Cod, MA. July 1988 - February 1990. Dr. Burnell is currently Manager for the RI/FS at the Massachusetts Military Reservation where 60 individual contamination sites and four major groundwater contaminant plumes have been identified. Dr. Burnell is responsible for all technical activities, budget, schedule and coordination of the large multi-disciplinary staff on this project. The work has included the development of site inspection work plans, active field programs, feasibility studies, initiation of

remedial design and application of a vigorous community relations program. Dr. Burnell is also responsible for client contact and interactions with the Air National Guard Bureau, ANG Headquarters, Air Force, Army, and Coast Guard base personnel, U.S. Geological Survey, elected representatives of communities surrounding the base, and State and National Regulatory Agencies.

Dr. Burnell has been instrumental in developing methodologies to pursue the DOD's goal of expedited cleanup of installations through an aggressive program of Focused Feasibility Studies/Interim Remedial Measures, working with the military clients and the Regulatory Agencies.

Dr. Burnell is a Senior Technical Reviewer for RI/FS projects at Barnes, G.L. Martin, Martinsburg, Stewart, Suffolk, Atlantic City, Schenectady and Bangor ANG bases, Loring and McGuire Air Force bases.

PACIFIC NORTHWEST LABORATORIES, Richland, WA. September 1986 - June 1968
Technical Group Leader, Chemical Systems Evaluation Group
Project Manager (dual job)

USDOE, Waste-Barrier-Rock Interactions--Dr. Burnell was the Project Manager and Lead Scientist for a major U.S. DOE-funded national laboratory study of the behavior and fate in the natural environment of radionuclides and other inorganic contaminants from radioactive and mixed waste. The focus was the mobility of various species (isotopes of U, Pu, Np, Am, Cm, Cs, Sr, Tc, I, C and anionic species NO_3, SO_4, CO_3, Cl, F) under conditions of varying groundwater pH, oxidation state, and flow rate through host media of varying mineralogy. His responsibilities included direction of technical, programmatic, budgetary, and QA/QC aspects of the project.

Defense High-Level Waste Interactions--Dr. Burnell was the Project Manager and Lead Scientist for a study of glass waste forms and the behavior of contaminants leached from radioactive glass in the natural environment.

Radionuclide Transport Parameters--Dr. Burnell was Project Manager for a laboratory study of the diffusivity of radionuclides contaminants through clay barriers using radioactive tracers.

Group contained 13 scientists, 8 technicians performing contract research on "complex chemical systems". Emphasis was on the behavior of waste and its interactions with the natural groundwater-rock-soil system. Responsibilities included business development, "mentor" role for group members, and team-building to meet needs of the organization. He also managed several projects dealing with radionuclide behavior in the natural environment. Projects included Waste Form Hydrothermal Interactions, Radionuclide Transport Parameters and Borosilicate Glass Waste Form Stability. Responsibilities included client interface, project development, budget/schedule control, and supervision of project participants.

ROCKWELL HANFORD OPERATIONS, Richland, WA June 1984 - September 1986
Hydrothermal Testing Project Manager

Materials Interactions Activity Manager--Dr. Burnell was Manager for the waste package materials interactions program in support of a U.S. DOE program for radioactive waste disposal. In this position, Dr. Burnell was responsible for developing a program responsive to DOE needs and federal regulatory requirements, coordinating and tracking the efforts of sub-contractors, assessing unsolicited proposals, and representing the technical aspects of the program to the scientific/engineering community and the general public.

Responsibilities involved the overall direction of a $4.5 million experimental and field (natural analog) geochemistry program including definition of project goals according to regulatory and permitting requirements, development of budget and schedule, evaluation of proposals from sub-contractors and oversight of sub-contractors, synthesis of data from all sources, preparation of oral and written reports, and interface with client, regulatory agencies, technical groups, and the general public.

AUBURN UNIVERSITY, Auburn, AL August 1980 - June 1984
Assistant Professor of Geology

Taught courses in geology, geochemistry, environmental geology, and engineering geology; supervised graduate student research, and represented department to the state. Elected representative to Faculty Senate and served on numerous academic committees.

ADDITIONAL EXPERIENCE

Dr. Burnell has participated in numerous field programs involving surface and sub-surface geologic mapping and stratigraphic correlation in New England, the southern Appalachian mountains and Piedmont, the Great Lakes region and the Pacific Northwest. His experience includes geophysical surveys and interpretation and resource evaluation.

EDUCATION

Ph.D/ Geochemistry, Brown University, 1982
M.S./Geology, University of Minnesota-Duluth, 1976
A.B./Geology, Franklin and Marshall College, 1974

PROFESSIONAL AFFILIATIONS

American Geophysical Union
Materials Research Society
American Mineralogical Society
Geological Society of America

PUBLICATIONS

Lane, D.L., Rawson, S.A., Allen, C.C. & Burnell, 1989, Coupled transport and chemical reaction in basalt groundwater flow-through experiments, I. Alteration phase distributions and theoretical considerations, Chemical Geology, vol. 76, pp. 327-340.

Rawson, S.A., Neal, W.L., & Burnell, 1988, The effect of waste package components on radionuclides released from spent fuel under hydrothermal conditions, in: Apted, & Westerman, eds., Scientific Basis for Nuclear Waste Management XI, vol. 112, pp. 453-464.

Goldberg, S.A. & Burnell, 1987, Rubidium-strontium geochronology of the Farmville Granite, Alabama inner Piedmont, in Drummond, M.S. & Green, N.L., eds., Granites of Alabama, Geological Survey of Alabama, Tuscaloosa, pp. 251-257.

Jones, T.E., Coles, D.G., Britton, R., & Burnell, 1987, Development and evaluation of a tracer-injection hydrothermal technique for studies of waste package interactions Scientific Basis for Nuclear Waste Management X, Bates & Seefeldt, etc., pp. 421-432.

Cook, R.B., and Burnell, 1986, The trace element signature of major lithologic units, Dahlonega District, Georgia; in Volcanogenic Sulfide and Precious Metal Mineralization in the Southern Appalachians, U. Tennessee, Knoxville, TN, Misra, K. ed., pp. 206-219.

Burnell, Thomas, L.E., Coles, D.G., 1986, Initial hydrothermal waste package release experiments using spent fuel with waste package components, Basalt Waste Isolation Project; in Advances in Ceramics, Nuclear Waste Mgmt. II; Amer. Ceramic Society, D.E. Clark, W.B. White, A.J. Machiels, eds. vol. 20, pp. 361-371.

Salter, P.F., Burnell, & Lane, D.L., 1986, Overview of the waste/barrier/rock integrated testing program of the Basalt Waste Isolation Project; in Advances in Ceramics, Nuclear Waste Mngt. II; American Ceramic Society, D.E. Clark, W.B. White, A.J. Machiels, eds., vol. 20, pp. 79-88.

Burnell & Rutherford, M.J., 1984, An experimental investigation of the chlorite terminal equilibrium in pelitic rocks; American Mineralogist, vol. 69, pp. 1015-1024.

Burnell, & Cook, R.B., 1984, Preliminary Geologic Map of the Dahlonega District, Georgia; Georgia Geol. Survey Open File Rep. 85-3.

Knight, S.K, & Burnell, 1984, The petrology of the Farmville Granite; Alabama Academy of Science Jour., vol. 12, pp. 14-18.

Burnell & Davidson, D.M. Jr., 1977, Geologic Map of Brule Lake Quadrangle; Minnesota Geol. Survey Misc. Map Series, M-29.

ABSTRACTS

Cook & Burnell, 1988, Geochemical investigation of the Mason Mountain sperrylite occurrence, Macon County, NC, Geological Society of American Abst. w/ Programs (SE Section)

Rawson, Neal, & Burnell, 1988, A summary of research on the behavior of spent fuel under hydrothermal conditions, Invited Paper, 8th International Spent Fuel Workshop, Winnipeg, Manitoba.

Rawson, Neal, & Burnell, 1987, The effect of waste package components on radionuclides released from spent fuel under hydrothermal conditions Materials Res. Society, Annual Meeting.

Jones, Burnell, Thomas, & Uziemblo, 1987, Fate of the pertechnetate ion in reactions with waste package components under basalt repository conditions; Mtrls. Res. Society, Annual Meeting.

Burnell, Coles, D.G., Thomas, L.E., 1986,Initial hydrothermal waste package release experiments using spent fuel with waste package components; American Ceramic Society 88th Annual Meeting Abst., p. 504.

Coles, D.G., Mahoney, J.J., & Burnell, 1986, Observations of selected actinide and fission product chemistry during basalt-repository waste package hydrothermal experiments; American Chemical Society, 41st NW Reg. Conference, Portland, OR.

Salter, P.F., & Burnell, 1986, Overview of the waste/barrier/rock integrated testing program of the Basalt Waste Isolation Project; American Ceramic Society 88th Annual Meeting Abstracts, p. 497.

Lane, D.L., Rawson, S.A., Allen, C.C., & Burnell, 1986, The distribution of alteration phases during basalt-groundwater interactions: preliminary insights from flow-through experiments; 3rd Annual Symposium on Water-Rock Interactions, Reykjavik, Iceland.

Burnell, Grandstaff, D., and Cummings, M.L., 1986, Natural analogs: application to prediction of long-term radionuclide isolation in a nuclear waste repository in basalt; American Chemical Society, 192nd Annual Meeting, Anaheim, CA, Abst. GEOC-61.

Reed, D.T., & Burnell, 1986, Effect of ionizing radiation on radionuclide speciation: preliminary results from site-specific experiments in a basaltic system; American Chemical Society, 192nd Annual Meeting, Anaheim, CA, Abst. GEOC-62.

Jones. T.E., Coles, D.G., & Burnell, 1986, Development and evaluation of a tracer-injection hydrothermal technique for studies of waste package interactions; Materials Research Society 1986 Fall Meeting, Boston, MA; Abst. L13.1.

Cook, R.B., & Burnell, 1985, Trace element signature of major lithologic units, Dahlonega District, GA; Geol Soc. Amer. Abst. w/ Programs, vol. 17, p. 85.

Goldberg, S.A., Burnell, & Fullagar, P.D., 1985, The Farmville Granite: a record of Acadian metamorphism in the Inner Piedmont of Alabama; Geol. Soc. America Abst. w/ Programs, vol. 17, p. 93.

Burnell, Coles, D.G., & Myers, J., 1985, An experimental study of the interactions of nuclear waste with potential waste package components from Hanford, WA; Geol. Soc. Amer. Abst. w/ Programs, vol. 17, p. 535.

Coles, D.G., Burnell, Simonson, S., & Myers, J., 1985, The effect of radiation field on technetium redox behavior in the system basalt-waste package components-groundwater; 9th Intl. Symposium on Scientific Basis for Waste Management, p. 6-2.

Burnell & Cook, R.B., 1984, Geochemistry of metavolcanic rocks in the Dahlonega area, Georgia; Geol. Soc. Amer. Abst. w/ Programs, vol. 16, p. 127.

Knight, S.K. & Burnell, 1984, The Farmvile Granite - An S-type granite in the Alabama Inner Piedmont; Geol. Society of Amer. Abst. w/ Programs, vol. 16, p. 150.

Cook, R.B., & Burnell, 1983, Geology of the Cahlonega District, Georgia, Geol. Soc. Amer. Abst. w/ Programs, vol. 15, p. 109.

Burnell, 1983, Garnet Compositional variation in migmatitic metapelites from south central Massachusetts; Geol. Soc. Amer. Abst. w/ Programs, vol. 15, p. 52.

Burnell & Rutherford, M.J., 1979, The terminal equilibrium of chlorite in the system K_2O-MgO-FeO-Al_2O_3-SiO_2-H_2O; Trans. Amer. Geophysical Union, vol. 60, p. 423.

Burnell, 1976, Petrology and structural relations of the Late Precambrian Brule Lake Intrusions, NE Minnesota; 22nd Annual Inst. Lake Superior Geology, p. 14.

Davidson, D.M., JR., Halls, H.C., & Burnell, 1976, Paleomagnetism of the Late Precambrian Brule Lake Intrusions, Cook County, Minnesota 22nd Annual Inst. Lake Superior Geology, p. 18.

Date of Update: 5/31/91

THOMAS E. CAMPBELL, Quality Assurance Specialist

EXPERIENCE SUMMARY

SPECIALIZED SKILL AREAS

EXPERIENCE

ABB ENVIRONMENTAL SERVICES, INC. Portland, ME. 1990 - present
Quality Assurance Specialist

WW ENGINEERING & SCIENCE/EDI ENGINEERING & SCIENCE, January 1987 - September 1989
Quality Assurance Supervisor
Computer Systems Supervisor

Mr. Campbell was responsible for the supervision of analytical quality assurance/quality control for a medium-sized environmental consulting firm. His duties included internal QA/QC program development and oversight, federal, state, and client certifications, EPA and other performance evaluation studies, and subcontractor QC monitoring. He also was responsible for laboratory software and data base maintenance, laboratory report generation, and $200K LIMS evaluation and development program.

UNIVERSITY OF ALASKA, ANCHORAGE, College of Arts and Sciences, September 1984 - July 1986
Science Laboratories Manager

Mr. Campbell was responsible for the management of science laboratory facilities within the College of Arts and Sciences, serving the disciplines of chemistry, biology, physics, geology, and astronomy. His range of duties included the coordination of facilities/equipment usage and maintenance, supervision of laboratory instructional and support staff, development and maintenance of computer based materials management and accounting systems, laboratory safety administration, and hazardous materials management. Specific management responsibilities included the direction of twenty laboratory instructional and six part time support staff members, physical responsibility for laboratory equipment and instrumentation valued at $2 million, control of $60,000 plus annual materials and services budget, and leadership responsibility in the formulation and administration of laboratory policy.

CITY OF KALAMAZOO, Department of Public Utilities, MI. August 1979 - September 1984
Water Quality Supervisor August 1979 - September 1984
Water Quality Analyst, February 1975 - August 1979

Mr. Campbell was responsible for the supervision of water quality activities for a 45MGD municipal water system, serving a population of 130,000. His range of duties included supervision of a water quality laboratory for product quality assurance, physical resource assessment and monitoring, regulatory compliance, operation support, and customer service. His administrative functions included preparation and control of $200,000 plus the annual operating budget, staffing and supervision of four professional and several technical positions, program design and implementation, and water quality policy formulation.

Mr. Campbell was responsible for the performance of a broad range of laboratory and field activities for the chemical, physical, and biological assessment of water quality within the municipal water system. Areas of responsibility included sampling and analysis of potable and non-potable waters using EPA and consensus methodologies, direction and training of subordinates, quality assurance, laboratory safety, inventory control, and preventive maintenance.

THE UPJOHN COMPANY, Kalamazoo, MI. July 1973 - September 1974
Research Chemist

Mr. Campbell's position involved the synthesis, isolation, purification, and analysis of organic compounds for screening as herbicides and growth regulators. Under the general direction of a research scientist, he produced over forty novel, biologically active compounds for further field testing. This was a temporary position funded by a corporate research grant.

EDUCATION

B.S./Biology, 1973, Western Michigan University, Kalamazoo, MI

ADDITIONAL COURSEWORK

Graduate Study in Business Administration, Western Michigan University, Kalamazoo, MI. Program for MBA is 60% complete.

PROFESSIONAL AFFILIATIONS

American Chemical Society, Division of Environmental Chemistry
American Water Works Association
National Association of Scientific Materials Managers

PROFESSIONAL CERTIFICATION

Michigan Water Treatment Plant Operator License - D1

MILITARY SERVICE

United States Navy, 1970 - 1972. Quartermaster assigned to U.S.S. Forrestal. Trained in conventional and electronic navigation. Served six months in Mediterranean operations. Honorably discharged.

RELATED ACTIVITIES

Laboratories Safety Committee, Chairman, 1985 - 1986. University of Alaska, Anchorage. College of Arts and Sciences.

Animal Research Committee, Chairman, 1984 - 1986. University of Alaska, Anchorage.

Water Quality Laboratory Handbook. Michigan Department of Public Health, 1983 - 1984. Authored section on analytical quality control and quality assurance.

Standard Methods for the Examination of Water and Wastewater, 15th Edition. Standard Methods Committee Joint Task Group for the development of methodology for conductivity and manganese determinations.

National Science Foundation, Summer Science Training Program, 1976. Instructor for intensive four week program involving twenty-nine top high school science students from five states. Focus was on the study of the chemical and biological aspects of freshwater aquatic systems.

THOMAS L. FRANCOEUR, PROJECT CHEMIST

EXPERIENCE SUMMARY

Thomas Francoeur is an environmental chemist with approximately 2 years of environmental chemistry and analytical experience. Mr. Francoeur is responsible for the evaluation of analytical chemical data as to its quality and useability in risk assessment. He is also responsible for the design, organization and implementation of Work Plans, Quality Assurance Program Plans, and on-site analytical programs.

SPECIALIZED SKILL AREAS

- Analytical Chemistry and Method Development
- Contaminant Transport Modeling
- Quality Assurance/Quality Control
- Contamination Assessment
- Data Validation and Evaluation

EXPERIENCE

ABB ENVIRONMENTAL SERVICES, INC., Portland, ME. June 1989 - present
Project Chemist, December 1989 - present
Data Validator, June 1989 - December 1989

As Project Chemist Mr. Francoeur has experience with large government clients as well as within the private sector. Mr. Francoeur was responsible for the fate and transport discussions in conjunction with several Priority 1 sites at Massachusetts Military Reservation (MMR) for HAZWRAP. In addition, he was responsible for the writing of and proper implementation of portions of the Quality Assurance Project Plan (QAPP) and Work Plan. When necessary, Mr. Francoeur produced specialty documents such as "Methyl Ethyl Ketone in Groundwater Samples at MMR". Thomas Francoeur has similar experience with USATHAMA, DOD, and NYSDEC. Projects worked on include Brunswick Naval Air Station, Suffolk Air National Guard, NYSEG - OWEGO, Tooele Army Depot, ServAll Laundry (NYSDEC), and Sheridan Waste Oil (NYSDEC).

Mr. Francoeur has completed similar work for private clients such as Public Service Electric and Gas, and Mariculture Products Ltd. Additional work completed for these clients includes contract and proposal preparation and litigation preparation.

Thomas Francoeur has conducted Data Validation and Evaluation for many of the above clients. Doing so he is familiar with the Statement of Work for both Organic and Inorganic analyses, the Functional Guidelines for Validation of both Organic and Inorganic Analyses, SW-846, and the NYSDEC ASP.

Analytical Chemistry - Mr. Francoeur has been instrumental in developing ABB Environmental's field analytical program including the research and development of new and innovative techniques.

Mr. Francoeur has extensive experience working in the field under USATHAMA and HAZWRAP Department of Defense contracts. His experience includes set-up, operation, maintenance and troubleshooting of field analytical systems. Significant methods incorporated into field programs include static headspace analysis (volatile organic compounds in soil); purge and trap GC analysis (volatile organic compounds in water); soil micro-extraction/GC analysis (pesticides). Mr. Francoeur is also directly involved in the Quality Assurance associated with field operations. These responsibilities also include the subsequent review and validation of the data generated by these field events.

ADDITIONAL EXPERIENCE

Mr. Francoeur has experience with many analytical techniques including GC-MS; Infrared Absorption Spectroscopy; FTIR Spectroscopy; NMR Spectroscopy; UV-VIS Spectrophotometry; HPLC; Atomic Absorption/Flame Emission Spectroscopy; and Potentiometric/Coulometric methods.

PUBLICATIONS/PRESENTATIONS

"On-site Analysis of Chlorinated Solvents in Groundwater by Purge and Trap/GC": Thomas L. Francoeur, Stephen Turner, Daniel Twomey and Brian Butler. (Publication date - 2/91.)

COMPUTER KNOWLEDGE

Mr. Francoeur has an extensive knowledge of WordPerfect 5.1, Quattro Pro, Lotus 1-2-3 and a working knowledge of dBase IV.

EDUCATION

B.A. Chemistry and Environmental Studies, 1989, Bowdoin College
Senior Thesis: "Coprostanol as an Indicator of Contamination in Bay Sediments: An Analytical Approach"

CERTIFICATIONS

40 hour training course in Waste Site Worker Protection completed to comply with OSHA 1910.120(e)(2): 07/28/89.

Also possess Red Cross certifications in CPR, First Aid, Advanced Life Saving, Water Safety Instruction, and Health Services Education.

Date of Update: March 4, 1991

RICHARD L. HEBERT, Environmental Scientist

QUALIFICATIONS SUMMARY

Mr. Hebert's areas of expertise include hazardous waste and hazardous materials management, environmental chemistry, toxicology, microbial degradation of pollutants, microbial ecology, and public health microbiology. He has more than 12 years of experience dealing with the following areas of environmental science: management of hazardous materials and hazardous wastes, regulatory compliance, development of remedial alternatives for hazardous waste sites, environmental chemistry and toxicology of pesticides, and microbial degradation of aromatic hydrocarbons and crude oil.

EDUCATION

B.S./Microbiology, 1974, University of Massachusetts

RELEVANT EXPERIENCE

Feasibility Study, Cannons Engineering Corporation, Bridgewater, MA--Mr. Hebert managed the development and production of a Feasibility Study report for this Superfund site, where several million gallons of a variety of hazardous wastes had been stored and incinerated. The site contains buildings, storage tanks, and an incinerator that require cleanup. In addition, soil and groundwater at the site are contaminated with a variety of organic contaminants. Risk-based target levels were developed for contaminated soil. A range of remedial alternatives were developed that was consistent with EPA guidance for compliance with 1986 amendments to CERCLA. Innovative treatment technologies assembled into remedial alternatives for the site include low-temperature thermal soil aeration and UV radiation/ozonation of groundwater.

REM III Site Manager, Cannons Engineering Corporation, Bridgewater, MA--As the REM III Site Manager for this Superfund site, Mr. Hebert was responsible for maintenance of budget and schedule for the following tasks: completion of Remedial Investigation initiated under REM-FIT, preparation of an Endangerment Assessment, a Wetlands Assessment, and a Feasibility Study, public meeting presentations, and a Responsiveness Summary.

Feasibility Study, New Bedford Harbor, New Bedford, MA--Mr. Hebert is working on several phases of the Feasibility studies for New Bedford Harbor (NBH), a Superfund site where several hundred acres of sediments are contaminated with PCBs and heavy metals. Mr. Hebert was responsible for evaluating the feasibility of in-situ biodegradation and the screening of other non-removal technologies. In addition, he is supervising and evaluating subcontractor efforts on bench-scale testing of biodegradation technologies for PCBs in NBH sediments. Mr. Hebert is also supervising the development and evaluation of remedial alternatives for the lower harbor and Buzzards Bay.

REM III Site Manager, RI/FS Work Plan, Solvents Recovery Service of New England, Southington, CT--As REM III Site Manager for this Superfund site, Mr. Hebert managed the development of a multiphased RI/FS Work Plan. For several years, solvent still bottoms were disposed into two unlined lagoons, and runoff from the site was uncontrolled. Extensive groundwater contamination from the site forced closure of a municipal well field, and the identification of several potential additional sites where uncontrolled releases may have occurred. The Work Plan included a survey of over 60 existing monitoring wells to assess their usefulness for field investigations. The Work Plan presented a multiphased approach to address total remediation of the principal site in conformance with CERCLA/SARA, as well as remediation of the municipal well field and identification of additional sources of contamination.

RCRA Facility Assessment (RFA), First Hartford Corp., Waterville, ME--Mr. Hebert was the Site Manager for this RCRA Facility Assessment (RFA) for EPA at a former wool processing facility which treated and discharged caustic wastes containing many organic contaminants. The RFA included a review of the facility's past

compliance with RCRA regulations and a sampling and analysis program designed to assess the distribution of contamination in and around the waste management units at the site, and the threat of a potential release from the site.

RCRA Groundwater Compliance Monitoring Evaluations at Several Sites in Connecticut-Mr. Hebert managed a program of Compliance Monitoring Evaluations (CMEs) at seven sites in Connecticut. The CMEs were conducted for EPA to assess compliance with RCRA groundwater monitoring regulations and the quality of groundwater monitoring data obtained by facilities. The CMEs included independent and split sampling programs designed to assess the quality of data reported by the facility.

RCRA Part B Permit Application, C-E Power Systems, Windsor, CT--Mr. Hebert managed the preparation of a RCRA Part B Permit Application for a facility at which hazardous wastes are generated and stored.

Phase IV-A, U.S. Air Force Installation Restoration Program, Castle AFB, Merced, CA--Mr. Hebert conducted a site visit, reviewed Phase I Records Search and Phase II Confirmation/Quantification studies, and prepared a Statement of Work for Remedial Action for the site, where groundwater is contaminated with trichloroethylene.

Technical Inquiry Program, Hazardous Materials Technical Center (HMTC), Defense Logistic Agency (DLA)-Mr. Hebert managed this hotline service operated by Dynamac Corporation for the DLA's HMTC. The program provided Department of Defense (DOD) personnel with technical expertise and regulatory guidance on inquiries dealing with: hazardous materials storage, handling, and transport; hazardous waste characterization and management; remedial actions worker safety; and environmental toxicology and hazard assessments for numerous hazardous materials used by DOD personnel.

ADDITIONAL EXPERIENCE

Mr. Hebert managed a contract with Maine Board of Pesticide Control to develop and implement a quantitative ecological evaluation process to screen pesticides widely used in Maine, for environmental/ecological hazards. Mr. Hebert reviewed and evaluated private industry toxicology studies and environmental chemistry studies for EPA in support of the Agency's pesticide registration and re-registration programs. In addition, he prepared Environmental Fate Profiles and Exposure Hazard Assessments on numerous pesticides for EPA. Mr. Hebert conducted independent research projects in microbial physiology that included the screening of 86 species of fungi for their ability to metabolize napthalene, and the isolation of fungi from the Gulf of Mexico capable of degrading crude oil.

PHILIP A. HELGERSON, Program Manager

QUALIFICATIONS SUMMARY

Mr. Helgerson has extensive Program Management experience with major government contracts. As a Department Manager and member of the Program Group Leadership Team, Mr. Helgerson provides business, program management and contract management experience to major programs. He has more than twenty years of experience in federal procurement.

EDUCATION

M.S., Business and Public Administration, 1976, George Washington University
B.A. Liberal Arts, 1967, Brown University

RELEVANT EXPERIENCE

Department Manager, Environmental Studies Department -- Mr. Helgerson is currently the Department Manager for the Environmental Studies Department, which has provided consulting services for the Industrial Technology Division of the Environmental Protection Agency. In addition, Department personnel support Remedial Investigations and Feasibility Studies for a variety of sites and projects, mostly in federal facilities.

In addition to Department Management responsibilities, Mr. Helgerson provides business and program management responsibilities for the Programs Division, including contract management responsibilities for major federal contracts.

ADDITIONAL EXPERIENCE

Prior to joining ABB Environmental Services, Mr. Helgerson held contract administration and financial management assignments with large Department of Defense programs for the U.S. Navy. His experience included extensive involvement with cost and schedule control systems, long range planning and budgeting, inventory management, and contract administration, including assignments as the Contracting Officer for major weapons systems procurements for the U.S. Navy, and as the Business and Financial Manager for major Navy ship construction and repair programs.

ALLEN J. IKALAINEN, Project Manager

QUALIFICATIONS SUMMARY

Mr. Ikalainen's areas of expertise include civil and environmental engineering and project management. His work experience includes three years of civil engineering with the New England Division, U.S. Army Corps. of Engineers, fifteen years of field investigation, systems analysis and environmental permit development experience with the U.S. Environmental Protection Agency and four years experience in project management and technical direction of hazardous waste site investigations and remedial action feasibility studies. At E.C. Jordan, his hazardous waste experience includes management of site surveys for hazardous waste contamination, groundwater contamination investigations and Superfund site remedial investigations, feasibility studies and remedial design.

EDUCATION

M.S./Environmental Engineering, 1978, Northeastern University
B.S./Civil Engineering, 1967, Worcester Polytechnic Institute

PROFESSIONAL LICENSES

Professional Engineer - Maine, Massachusetts

RELEVANT EXPERIENCE

Installation Restoration Program, U.S. Air Force--Mr. Ikalainen is Program Manager for E.C. Jordan's Hazardous Waste Remedial Action projects at Air Force facilities in the Northeast. The projects include RI/FS, remedial design and underground storage tank investigations.

REM III Program, U.S. Environmental Protection Agency--For RI/FS projects at Superfund sites in Region 1, Mr. Ikalainen directed day to day program activities as part of the REM III contract team for EPA - Region 1. This included planning and conducting RI/FS projects at eleven National Priorities List sites and RCRA Compliance Monitoring at operating industrial waste disposal facilities.

Remedial Investigation/Feasibility Study, New Bedford Harbor Superfund Site, MA--Mr. Ikalainen served as Site Manager for the overall RI/FS for this 1000 acre site contaminated with PCBs and metals. He prepared a detailed project management plan and was responsible for management and technical direction of subcontracted physical/chemical and food chain modeling, coordinating with the U.S. Army Corps. of Engineers Waterways Experiment Station laboratory on pilot dredging, disposal studies, and completion of the overall Feasibility Study including a risk assessment, bench tests of treatment technologies and detailed evaluation of remedial alternatives.

Remedial Investigation/Feasibility Study, Pine Street Canal Superfund Site, VT--To enable the State of Vermont Agency of Transportation to decide if they should proceed with plans to construct a highway through a portion of this coal tar site. Mr. Ikalainen directed preparation of a RI/FS Work Plan defining field sampling, data evaluation, risk assessment and remedial alternative evaluations as required under CERCLA.

Assessment of Nature and Extent of Groundwater Contamination for a Confidential Semiconductor Manufacturer--Mr. Ikalainen managed the analysis and evaluation of groundwater monitoring data to define the nature and extent of organic solvent contamination and contaminant transport processes for this large semiconductor manufacturer. The evaluation was done as part of the facilities corrective action plan under the Resource Conservation and Recovery Act (RCRA) permit program.

Assessment of Abandoned Manufacturing Sites for Past Disposal of Hazardous Wastes, ME--On behalf of a commercial developer Mr. Ikalainen managed assessment of historic land uses, and field evaluations of surface

and subsurface contamination at two abandoned foundry and metal fabrication sites. Field evaluations included sampling of soil and groundwater for chemicals classified as hazardous by state and federal environmental agencies.

Evaluation of Toxicity of Manufacturing Discharge, ME--Mr. Ikalainen directed a toxicity assessment program utilizing bioassay procedures for an electrical products manufacturer. The program included chemical analysis of process water discharges, receiving waters and selection of appropriate test species for assessment of heavy metal toxicity.

ADDITIONAL EXPERIENCE

Mr. Ikalainen has managed wastewater disposal planning and an evaluation of a large fuel storage tank farm for assessment of tank contents and potential development. He is experienced in federal regulatory programs dealing with industrial waste disposal, ocean disposal and wetlands protection.

RONALD A. LEWIS, Senior Chemical Engineer

QUALIFICATIONS SUMMARY

Mr. Lewis' 14 years of experience include industrial wastewater treatment (principally for chromium removal), hazardous waste management systems, (including operation of a RCRS permitted facility), sample collection and management, hazardous waste site data interpretation, groundwater flow and contaminant transport modeling, risk assessment, health and safety planning, and public presentations. Although he has performed several roles in hazardous waste site assessments, he is currently technical consultant for several ongoing Superfund site projects which fall under both CERCLA and RCRA jurisdiction.

EDUCATION

Post-graduate work, Chemical Engineering, 1966-70, University of Maine
M.S./Chemical Engineering, 1966, University of Maine
B.S./Chemical Engineering, 1964, University of Maine

RELEVANT EXPERIENCE

Love Canal Remedial Project, New York--Activities included field coordinator of sample collection for a perimeter survey of contaminant migration from the Canal; design of a long-term perimeter monitoring program including calibration and use of a three dimensional groundwater flow model (including consideration of fractured dolomite) for the site; technical direction of the implementation of the monitoring program; assessment of geologic, hydrogeologic and chemical data; and preparation and presentation of reports.

IBM Groundwater Assessment Project, Vermont--Mr. Lewis was the primary investigator for a groundwater modeling project being performed to further define groundwater flow at the site (including flow in bedrock) and to evaluate through groundwater modeling and solute transport analysis present and proposed remedial actions at the site (corrective measures survey and corrective action program).

Remedial Investigation/Risk Assessment--Mr. Lewis has provided technical input into several RCRA Superfund and REM III sites. He has conducted site characterizations, fate and transport studies in various media, and transport modeling to determine target levels for remedial action alternative evaluation. He also provides support and review for other project investigations and reports.

ADDITIONAL EXPERIENCE

Mr. Lewis' industrial experience included responsibility for all facets of environmental concern including liaison with government regulatory agencies and consulting engineering firms. He has supervised operation of a 1 MGD physical/chemical wastewater treatment plant, which featured advance treatment in the use of ion exchange for the removal of hexavalent chromium and other metals in conjunction with more standard methods for metals and cyanide treatment. He initiated modifications in plant operation made necessary by changing regulations, including RCRA. In addition, he has performed major or supporting roles for investigation of over a dozen Superfund sites and numerous other hazardous waste sites including two Department of Defense investigations. He has continued to increase his knowledge in several areas through participation in several short courses, including flow in fractured media (by S. Neuman), and groundwater modeling courses presented by Thomas Prickett and by GeoTrans, Inc. His other experience includes permit applications, and chemical analytic methodology (atomic absorption spectroscopy, infrared spectroscopy and wet methods).

CHARLES P. LYONS, C.G., Senior Geologist

QUALIFICATIONS SUMMARY

Mr. Lyons designs and implements geologic/hydrogeologic investigations for E.C. Jordan's Environmental Services division. He is responsible for developing, implementing, and directing geologic/hydrogeologic investigations for Federal and private client remedial investigations and site assessments at hazardous and non-hazardous sites. His experience also includes extensive involvement with RCRA compliance and geophysical investigations.

EDUCATION

B.A./Geology and Chemistry, University of Maine, 1978

PROFESSIONAL AFFILIATIONS

Association of Groundwater Scientists and Engineers
Geological Society of America
Geological Society of Maine

PROFESSIONAL REGISTRATION

Geologist - Maine

RELEVANT EXPERIENCE

E.C. Jordan, Portland, ME. 1981 to present
Senior Geologist

Mr. Lyons is responsible for the development, implementation and direction of large- and small-scale geologic/hydrogeologic investigations. His experience is derived primarily from Remedial Investigations (RI) at National Priority Listing (NPL) sites. Mr. Lyons has been directly involved in investigations at over 15 NPL sites; and has been the RI leader at three sites and the Field Operations Leader at another three of these sites. In addition, he has been directly involved with development or review of investigations and/or report writing at another 25 NPL sites.

Mr. Lyons has also had extensive experience with Site Assessments, completing over 10 sites in the last two years. He has great familiarity with RCRA enforcement and compliance, and has prepared and conducted 13 compliance evaluations in accordance with 40 CFR 265. He has assisted many clients in their efforts to comply with regulations. Mr. Lyons has also implemented the RCRA 3012 program for a state regulatory agency for 103 sites within the state of Florida.

Mr. Lyons also has extensive experience in the private sector. He has worked on over 40 sites for private concerns, ranging from landfill permitting and closure and groundwater searches to groundwater investigations and source characterization. He is experienced with all types of utility company concerns, including RCRA compliance, groundwater development, treatment facility locating, waste characterization, and spill containment.

Mr. Lyons has acquired extensive expertise involving geophysical techniques, instruments, investigation, and interpretation. He also has experience with various types of remote sensing devices and implementation for investigations. He has combined his previous petroleum geophysical knowledge with traditional techniques to establish a broad geophysical understanding. His ability to apply geophysical techniques to geologic/hydrogeologic investigations has contributed to many projects.

DEBORAH L. SMITH, Quality Assurance Coordinator

EXPERIENCE SUMMARY

As Quality Assurance Coordinator within the Environmental Services Division, Ms. Smith assists in and coordinates implementation of QA procedures for specific programs and projects. This position requires a working knowledge of program and project activities sufficient to provide support and monitor implementation of QA procedures.

Ms. Smith's 10 years of experience have resulted in her technical expertise in a variety of environmental consulting and research laboratories. Additionally, she has managed a professional office for 2 years, designing procedures and coordinating activities.

EXPERIENCE

E.C. JORDAN CO., Portland, ME. 1989 to present
Quality Assurance Coordinator

Assisted in the preparation of a contamination assessment for a Remedial Investigation/Feasibility Study (RI/FS).

INDEPENDENT CONSULTANT, 1987 TO 1989

Ms. Smith assisted in the preparation of a standard operating procedures manual for a local environmental firm. Her particular emphasis was given to the Quality Control/Quality Assurance (QC/QA) section for inorganics, with additional assistance provided to resolve analytical problems.

ROBERT S. AMIDON AND ASSOCIATES, 1987 to 1989

As Office Manager employed by this forensic and vocational rehabilitation counselor, Ms. Smith was responsible for all aspects of professional office support, including accounting, bookkeeping, and computerization of office records.

AQUATEC, INC., 1984 to 1986

Senior Chemist - Having independent responsibility for resolution of industrial problems, Ms. Smith was involved in the review of the initial contract proposal for the New York State Hazardous Waste Program. This required a working knowledge of U.S. EPA methodologies, as well as federal and state waste disposal regulations.

Laboratory Analyst - Ms. Smith performed trace metal analysis using Perkin Elmer 5000. She also handled EP TOX preparations and determinations, and mercury determinations by EPA cold vapor trap method.

UNIVERSITY OF VERMONT, VERMONT REGIONAL CANCER CENTER
Laboratory Technician, 1984 to 1985

Ms. Smith performed general laboratory work including surgical techniques, drug toxicity testing, ELISA's, antibody conjugations, 32P incorporation studies, gradient gel electrophoresis, gel chromatography, and platinum determinations using Perkin Elmer 560.

UNIVERSITY OF RHODE ISLAND
Teaching Assistant/Summer Research Fellowship, 1983 to 1984

Ms. Smith assisted in a research topic designed to test the interrelation of the mammalian urea cycle and pyrimidine metabolism. The experimental methods involved cocrystallizations of radiolabeled metabolites with

carrier to isolate incorporated radiolabeled precursors from both perfused rat livers and isolated hepatocytes. Incorporation was measured by scintillation counting. Laboratory course experience included HPLC, IR, TLC, electrophoresis, ultracentrifugation, spectrophotometry, and standard wet chemistry methods.

CENTER FOR ATMOSPHERIC CHEMISTRY STUDIES, RHODE ISLAND NUCLEAR SERVICE CENTER
Marine Research Specialist, 1981 to 1983

Ms. Smith was responsible for processing, analysis, and data interpretation of aerosol samples from worldwide sites. Various element/element ratios and smelter plumes were among the signals used to tag air masses. Samples were analyzed by neutron activation in conjunction with Gammanalysis. She performed some work with sulfate analysis, and acquired familiarity with PDP-11, DEC, and IBM prime computers using Fortran, Basic, and SAS.

MARINE ECOSYSTEMS RESEARCH LABORATORY, UNIVERSITY OF RHODE ISLAND GRADUATE SCHOOL OF OCEANOGRAPHY
Marine Research Specialist, 1976 to 1981

At the Marine Ecosystems Research Laboratory at the University of Rhode Island Graduate School of Oceanography, Ms. Smith was responsible for collection, storage, processing, and analysis of trace metal samples using high purity clean room techniques. Samples included sediment (benthos), particulate, and soluble fractions of seawater. Preparation methods involved acid leaching, low temperature ashing and acid digestion, Chelex-100 and APDC-MIBK extractions, and direct analysis. Analyses were performed on a Perkin Elmer 603 using a graphite furnace with D2 arc background correction and flame techniques. Matrix matching and matrix modification were employed. Additional responsibilities included the training and supervision of student assistants, as well as technical guidance for NSF summer students. Ms. Smith presented an invited paper at the regional ACS meeting; the paper was a critique of various methods used to determine extraction efficiencies of Chelex-100.

ADDITIONAL EXPERIENCE

As a chemist and research specialist, Ms. Smith has 10 years of laboratory experience encompassing a variety of techniques and parameters, including trace element analysis, neutron activation, biochemical assays, and environmental contamination assessment.

EDUCATION

Graduate Coursework, Biochemistry, University of Rhode Island
B.S./Biology, 1976, Muhlenberg College

ADDITIONAL COURSEWORK

Quality Assurance, Auditing Course, Martin Marietta Energy Systems, Inc.
Quality Assurance, Loss Prevention Seminar, American Society of Foundation Engineers
Quality Assurance, Transformation in Management Seminar, Dr. W. Edwards Deming, University of Southern Maine

PUBLICATIONS

Hunt, C.D., and D.L. Smith. 1983. Remobilization of metals from polluted marine sediments. Can. J. Fish. Aquat. Sci. 40 (Suppl. 2): 132-142.

Hunt, C.D., and D.L. Smith. 1982. Controlled marine ecosystems - a tool for studying stable trace metal cycles: long term response and variability, p. 113-122. In G. Grice and M. Reeve (ed.) Springer-Verlag, New York.

Hunt, C.D., and D.L. Smith. 1980. Conversion of dissolved manganese to particulate manganese during a diatom bloom: effects on the manganese cycle in the MERL microcosms, p. 850-868. In G. Grisy, Jr. (ed.) Microcosms in ecological research. DOE Symposium Series, Augusta, GA, Nov. 8-10, 1978, CONF-781101, NTIS.

JEFFREY S. SMITH, Public Health Scientist

EXPERIENCE SUMMARY

Mr. Smith is a Public Health Scientist with more than three years experience in performing risk assessments and health assessments. His current responsibilities with ABB-ES, include performing Public Health Risk Assessments of hazardous waste sites. His present activities include performing public heath risk assessments of hazardous waste sites.

SPECIALIZED SKILL AREAS

- Public Health Risk Assessment
- Exposure Assessment
- Toxicity Assessment
- Target Level Development
- Exposure Modeling

EXPERIENCE

ABB ENVIRONMENTAL SERVICES, INC., Wakefield, MA. 1989 - present
Public Health Scientist 1989 - present

Department of Defense Installations. September 1989 - present. Mr. Smith currently serves as the Public Health Risk Assessment Technical Lead at a number of Department of Defense installations. This involves developing strategies for conducting public health risk assessments for multiple sites at each installation.

Public Health Risk Assessment, Vineland Developmental Center, Vineland, NJ. June 1989 - October 1989. Mr. Smith served as the Lead Public Health Scientist for the preparation of a multi-media public health risk assessment of four discrete contamination sites at a state residential facility for mentally handicapped women. He was responsible for all phases of the risk assessment. Contaminants of concern included carcinogenic and noncarcinogenic PAHs, pesticides, and heavy metals. Exposure pathways examined included direct contact and incidental ingestion of soil, as well as inhalation of fugitive dusts caused by excavation activities. Because of the unique nature of the population at risk, special considerations were required in developing appropriate exposure scenarios.

Surface Impoundment Closure Plan, Confidential Client, Boston, MA. May 1989 - present. Mr. Smith developed a methodology for determining acceptable concentrations of contaminants in soil beneath surface impoundments at two facilities in Boston based on environmental criteria. A procedure was established to set target levels for contaminants in soil based on their ability to leach to groundwater. The groundwater was not an adequate potable water supply because of its brackish quality; therefore, target levels were based on environmental standards and criteria.

Multi-pathway Risk Assessment for the Shirley Resource Recovery Facility, Shirley, MA. November 1989. Mr. Smith was responsible for assessing the risks to public health associated with the consumption of recreationally caught fish that has bioconcentrated pollutants. This involved determining surface water concentrations based on direct deposition and runoff, calculating concentrations in fish, and estimating exposure-dose.

NEW HAMPSHIRE DIVISION OF PUBLIC HEALTH SERVICES, Concord, NH. 1987 - 1989
Environmentalist 1987 - 1989

Health Assessments of NPL Sites. January 1988 - March 1990. Mr. Smith performed health assessments of NPL sites in New Hampshire under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). These assessments were designed to assess the potential public health implications of

exposure to site contaminants, to identify gaps in data set, and to provide recommendations for follow-up health studies.

Contaminated Drinking Water Program. August 1987 - January 1988. As coordinator, Mr. Smith was responsible for providing recommendations to citizens with contaminated private wells as to the safety of their water.

Preliminary Assessments. April 1987 - August 1987. Under a multi-site cooperative agreement with USEPA, Mr. Smith prepared Preliminary Assessments and Toxicological Profiles of hazardous waste sites.

EDUCATION

M.S. Public Health, 1987, University of Massachusetts
B.A. Biology, 1983, The Johns Hopkins University

PROFESSIONAL AFFILIATIONS

American Public Health Association

PUBLICATIONS/PRESENTATIONS

"Indoor Air Benzene Concentration Found in Six Homes with Known Gasoline Contamination of Drinking Water," presented at the 116th Annual Meeting of the American Public Health Association, November 1988.

"A Rapid Approach to Assessing Risks Associated with Contaminated Soils at Industrial Sites," presented at the Air and Waste Management Association New England Section Conference, February 1990.

Date of Update: 4/19/90

CYNTHIA E. SUNDQUIST, Health and Safety Supervisor

QUALIFICATIONS SUMMARY

Ms. Sundquist has more than eight years of experience in the evaluation of physical, health and environmental hazards in the industrial, municipal and environmental sectors. She has conducted surveys to assess such site factors as chemical use, storage of hazardous materials, noise levels, and air quality. Ms. Sundquist is instrumental in the development and implementation of corporate health and safety policies, and she updates health and safety guidelines. She currently serves as Chairperson of the corporate Personnel Health and Safety Committee and acts as liaison between the staff and managerial personnel on health and safety issues.

EDUCATION

M.S. (equivalent)/Industrial Hygiene, 1985, Liberty Mutual Insurance
B.S./Microbiology (Environmental Health), 1980, San Jose State University

CERTIFICATIONS

Certified Safety Professional - Board of Certified Safety Professionals of the Americas, Inc.

AFFILIATIONS

American Industrial Hygiene Association - Down East Section
American Society of Safety Engineers - Professional Member

RELEVANT EXPERIENCE

E.C. Jordan Co., Portland, Maine--As Health and Safety Supervisor, Ms. Sundquist is responsible for the health and safety of all Jordan employees. Ms. Sundquist has developed and presented the annual refresher and supervisory training courses required by 29 CFR 1910.120, and oversees the medical surveillance program to ensure all applicable employees are enrolled in the program. She provides technical review and approval for all Health and Safety Plans to ensure compliance with company policies and applicable regulations. She checks to ensure that the level of personal protection selected is adequate for site conditions and that the monitoring equipment chosen will detect contaminants of concern. Ms. Sundquist conducts health and safety audits at hazardous waste sites to assess compliance with Jordan policies and applicable regulations.

REM III - Ebasco Services, Inc., Arlington, Virginia--Ms. Sundquist is Jordan's REM III, Company Health and Safety Supervisor and as such, acts as the liaison between Jordan and the REM III Health and Safety Manager. She has the overall responsibility for development and implementation of all REM III Health and Safety Plans. She is responsible for the development of new company safety protocols and procedures necessary for field operations and will also be responsible for the resolution of any outstanding safety issues which arise during the conduct of site work. Some of the sites she has been involved with include Sullivans Ledge, New Bedford, MA; Saco Tannery Pits, Saco, ME; New Bedford Harbor, New Bedford, MA; Nyanza Chemical site, Ashland, MA; and Yawarski Landfill, Canterbury, CT.

Martin Marietta Energy Systems, Inc., Oak Ridge, Tennessee--Ms. Sundquist is Jordan's Health and Safety Coordinator for Martin Marietta Energy Systems. This is a staff level position which supports the functions of the Task Order Manager. She is responsible for ensuring that the project team complies with Jordan's Health and Safety Program and policies when conducting site operations. In addition, she is responsible for seeing that a Health and Safety Plan is developed for each site activity and that it addresses the hazards specific to the site. On-site conformance with safety protocols is ensured by periodic site visits. Some of the sites she has been involved with include Plattsburgh AFB, Plattsburgh, New York; Brandywine Defense Redistribution and Marketing Office Storage Area; Andrews AFB, Maryland; and Massachusetts Military Reservation, Falmouth, Massachusetts.

U.S. Army Toxic and Hazardous Materials Agency--Ms. Sundquist is Jordan's Health and Safety Coordinator for USATHAMA where she reports directly to the Project Manager. Her responsibilities include aiding in the development of health and Safety Plans (HASP); assuring that the HASP is distributed to appropriate personnel, assuring that the project team and particular, field personnel, comply with Jordan's HASP; and informs the Program Manager and appropriate USATHAMA personnel of any health and safety related incidents. The sites she has been involved with include Anniston Army Depot, Aberdeen Proving Ground, Maryland; and Badger Army Ammunition Plant, Wisconsin.

ADDITIONAL EXPERIENCE

Mountain View Fire Department, Mountain View, California--As Assistant Hazardous Materials Specialist, Ms. Sundquist played a major role in the enforcement of local ordinances and state regulations. The local ordinance has become a model for subsequent legislation due to its stringent and comprehensive approach to hazardous materials storage, including underground tank management. Ms. Sundquist worked with local businesses to bring them into compliance with new local, state, and federal regulations. She conducted audits to assess exposure and to monitor storage, handling and disposal of toxic materials. She responded to emergencies involving hazardous substances and aided the Regional Water Quality Control Board in the clean-up of local contaminated sites.

Liberty Mutual Insurance, Oakland, California--As Loss Prevention Consultant, Ms. Sundquist provided safety consultation with heavy concentration in industrial hygiene, pollution and industrial safety. She completed specialized Industrial Hygiene training and was designated as the Pollution Resource Coordinator for northern California. Ms. Sundquist was responsible for exposure identification and the recommendation of control measures for such factors as air quality, noise levels, ventilation systems, personal protection and chemical storage. From this experience she is familiar with the use and limitations of a wide variety of industrial hygiene equipment.

Stanford Research Institute, International, Menlo Park, California--As Lab Technician in the Life Sciences Division, Ms. Sundquist conducted genetic engineering research using the Ames Test. The purpose of this research was to improve the sensitivity of the test in its detection of carcinogenic compounds. This research involved conjugation using selective media; chemical survival and mutagenesis experiments; U.V. light survival and mutagenesis experiments and media preparation.